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Indexed in the Industrial Arts Index. Published every Thursday. Subscription Price North America, South America and U. S. Possessions, $8; Foreign, $15 a year. Single Copy, 35 cents.

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Cable Address, "Ironage" N. Y.

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This Week in The IRON AGE

Vol. 156, No. 9 August 30, 1945

Editorial

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Technical Articles

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Features

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News and Markets

o o o

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The IRON AGE

ESTABLISHED 1855

August 30, 1945

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The Job Changeover

ANYONE who was on the road the first week-end after VJ-Day had a glimpse of what peace will mean to the millions of movement-loving Americans. Every type, age and style of power propelled four wheel vehicle was out to taste the new freedom, regardless of whether they limped, leaped, lagged or languished by the roadside. It was a picture of America on the go. Whether most of them knew where they were going or what they would do after they got there is another subject.

Fortunately for the fulfilment of this desire, the roads had been previously laid out, surveyed and built. Otherwise there would have been rough going and much less of it. And that, I think, is a parallel to the situation we face in connection with the re-employment situation.

Most, if not all, of you have had opportunity during the past week to examine the report of the Committee for Economic Development, showing where the employers in over 300 divisions of industry have planned to go in the matter of expanding activities and employment over the 1939 levels. It is a bright and encouraging picture which would indicate the employment of 53.5 million people some 12 months after VJ-Day. The percent of industrial activity averaged over 1939 in durable, non-durable products and miscellaneous is estimated at 1.46 pct.

Even more encouraging than the actual figures, perhaps, is the evidence that these employers of America, from coast to coast and border to border, have been for the past two years surveying the roads and building them; roads leading to better business and more jobs for people. Three million or more individual plans for going forward; grass roots plans made by people who live and know their industries are better in a land of free enterprise, or any land for that matter, than a single master plan of political architecture.

But what is going to happen in the meantime while the changeover is taking place? Newspaper headlines and reports from Washington predict an unemployment of possibly eight million by the end of 12 months. Such reports are dangerous, misleading and damaging to morale.

As a matter of fact nearly 61 pct of our industries face no serious reconversion problem and can get into production in 30 days to 90 days. Maximum time of reconversion, applying to an extremely small percentage will not be more than 12 months and even here the average will not exceed six months due to gradual resumption.

Industry itself is more optimistic about the prospects than is official Washington or the news scareheads of sensational journalism. Ira Mosher, president of the National Association of Manufacturers, predicts that not more than one and a half million will be unemployed more than 30 days. The great majority of layoffs, he predicts, will be not more than 30 days.

The CED estimate of postwar markets, showing a probable employment of 53,500,000 within 12 months of the war's end should certainly give the public a realistic impression of the confidence of the people who must lead in the making of jobs, namely the employers of America. This is the greatest cooperative effort in planning for a better future ever undertaken and with the cooperation of Government and enlightened labor leadership it will succeed.

Better Steels are Coming— from the Tests of War

Hour after hour, month after month, Inland metallurgists study not only the needs for this war of steel, but also the requirements of a victorious America—the America that will turn again to peacetime developments in the crafts, and in the sciences—new developments that will prove again that free peoples set the pace for others to follow. Coming out of the tests of war are finer steels—steels that will set new standards of safety and speed in transportation. Steels that will help bring the newest advancements in swift communications into most homes in the land. Steels that will bring new conceptions of beauty, convenience, comfort, and utility—all at prices that can be afforded by the average American. Yes, you can look forward to the day when steel from Inland, now flowing 100 per cent into war products, will help build a greater America.

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The IRON AGE
August 28, 1945

NEWS FRONT

► In Germany ten manufacturing plants turned out the country's needs of hard cemented carbides, totaling some 88 tons monthly.

Ten standard grades of hard cemented carbide were selected to cover the whole range of hard metal application during the war. Varieties of carbide tips were cu from 350 in 1937 to a war-time total of 41.

The German grade S1 (78 WC, 16 TiC, 6 Co) was the type used in greatest quanti

A very promising tungsten-free hard cemented carbide was developed in Germany, being a titanium carbide-vanadium carbide material. Metal powder hot pressing als was brought to a high state of perfection.

► Britain's cheapest postwar car yet announced is offered by the Standard Co., w 8 hp touring model will sell for $1204, including $264 purchase tax.

► Builders using traditional methods of fabrication have answered the publicity generated by prefabrication enthusiasts in Britain by constructing a brick house i six days. It was the first such house built privately in Britain since 1939.

The house, which is in Birmingham, will be occupied by an ex-soldier and his family. It cost $4680, payable by a deposit of $480 and mortgage payments of $4.8 weekly over about 23 years.

► German steel alloys for high-temperature service in gas turbines for jet aircr were metallurgically inferior to several different alloys used in similar U. S. cr The Germans were badly handicapped by a serious lack of cobalt, but by very clever design such as internal cooling of blades their jet engines more than overcame thi metallurgical deficiency.

► Announcement that all P-80 Shooting Star fighters were grounded after the Bong crash was less unusual than the fact that over two weeks later only two of the cra had been released for test purposes.

Such wholesale groundings are frequently made on new types while urgent modifi tions are made, but they are commonly of very short duration.

Current difficulties could stem from metallurgical problems which are admitted not yet solved. Current engines operate in their critical temperature range, and after a few hours in flight the exhaust pipe should collapse from too long exposur high operating temperatures, the effect on such a plane as the P-80 would be to ca away the control surfaces.

These considerations may dictate the return to a twin engine type, along the l of the P-59A and the Me-262, or to some new unorthodox arrangement.

► Diamond cutting tools having three to seven 0.02 to 0.06-in. cutting edges sid side around the contour of the tool nose has found increasing favor. As each cutt edge becomes blunted a new facet is brought into cutting position by altering the position of the diamond holder.

► Of the three basic types of spun castings-true centrifugals, semi-centrifugals centrifuge--best properties are obtained by the use of the true or semi-centrifuga castings. In general, an increase of approximately 10 pct in tensile strength can achieved in true centrifugal castings.

► Close-fit threads have been secured without tapping or chasing by diecasting i zinc alloy. There is no parting in the axial plane, hence there is no flash on th thread itself.

► Materials problems in the automotive industry seem to be clearing themselves, especially inasmuch as no firms will be reaching a high level of production before October. Tin appeared to be the only material which would be unavailable when nee and substitutions are available for this shortage.

► The United Auto Workers CIO has served notice that a 30 pct industry wide wage increase to take care of the cut in take home pay will be adequate at this time. suggestion that an industry-wide contract be negotiated will probably be ignored.

Versatile Stowage With Eight-

THE eight-way pallet as used by the U. S. Navy's Bureau of Ordnance affords some basic handling advantages effective in all phases of palletized operations that include, among others, flexibility of stowage arrangements, reduction of aisle space required and strengthening of unit loads. At the Naval Ordnance Materials Handling Laboratory, Hingham, Mass., variations on the fork truck-pallet theme were first tested with scaled models (fig. 1). A variety of structural designs have been worked out for eight-way pallets in order to gain the durability and strength of steel with a minimum of weight. (see fig. 2). All are designed to be handled by fork trucks, hand pallet trucks, and cranes.

It may be stated as a general observation that an eight-way pallet set down from one direction may be picked up from another, so that removal of unit loads need not be a reversal of the placement process. For general handling this means easy maneuverability in confined spaces such as are commonly found at the end of production lines, in crowded aisles, or on narrow loading platforms. This feature is especially valuable in warehouses with a rapid turnover where the position of the aisles fluctuates and where stows are apt to be buried unless they are accessible from more than one side. It is also useful in lighter loading and shiploading because it eliminates the perplexing question of which way to face the stringers in each section of the hold. Carloading is greatly facilitated by the eight-way feature. Flat cars (and open highway trailers) can be loaded or unloaded from any direction by equipment on either ground level or platform level, an advantage which becomes important if the cars (or trailers) are used in a congested area. When box cars are being loaded with such items as ammunition in tanks, which often require that all the units face the same way, it is handy to be able to set pallets fore and aft into the door area without need for dunnage on the deck. Also, when a fork truck on ground level is feeding loads to a hand lift truck in the car, the hand truck

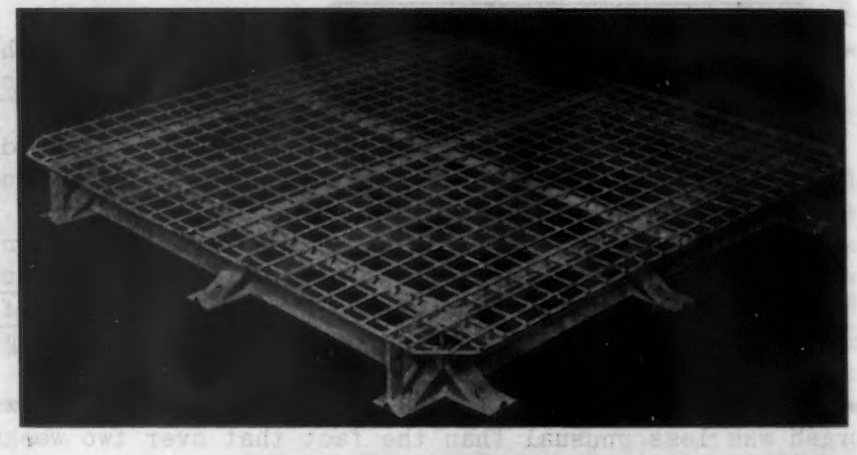

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FIG. 2 — Examples of eight-way pallets designed by U. S. Navy's Bureau of Ordnance.

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o o o

LEFT

FIG. 1—Problems in the efficient stowage of eight-way pallets in box cars were first worked out with the scaled models shown.

o o o

Way Pallets . . .

By LT. TEMPLETON SMITH, USNR
Naval Ordnance Materials Handling Laboratory,
U. S. Naval Ammunition Depot,
Hingham, Mass.

. . . Methods developed by the Naval Ordnance Materials Handling Laboratory for maneuvering an eight-way pallet with a fork truck provide a variety of space-saving stowage patterns not possible with the customary two-way pallet.

can run them directly into position without having to turn around.

By the eight-way entry, rectangular pallets can be used in a variety of stowage patterns that would be impossible if all the pallets had to be facing the same way. This feature can be a real space-saver in warehouses having structural disadvantages such as columns, alcoves, and the like. For example, if columns are 15 ft apart center-to-center, it is impractical to stow more than three standard 35x45½-in. Navy pallets of the two-way design between them, and nearly 4 ft of space is wasted. However, three eight-way pallets can be placed the wide way and one the narrow way.

In irregularly shaped warehouses with alcoves or bays, similar combinations can frequently be used to accommodate a greater number of loads than could be stowed with two-way pallets. Also, it may be convenient to pick up such pallets from the narrow side and take them through spaces too small for regular pallets whose stringers run the short way. In shiploading, the variety of patterns made possible often permits unit loads to be stowed in spots that would otherwise have to be filled with loose cargo.

A new range of carloading patterns have developed through use of eight-way pallets of the 35x45½-in. size, which will fit into a freight car either two abreast the 45½-in. way or three abreast the 35-in. way. The latter condition requires a freight car 9 ft 2 in. wide and a pallet load with an overlap of not more than ½ in. As a result, car capacity may be utilized more completely than was previously possible with this size of pallet. If the unit loads have no overlap, as many as 93 will fit into a standard 40-ft 6 in. freight car so snugly that virtually no bracing will be required. Even with 1⅜-in. of overlap on each of the 35-in. sides, 87 loads can be put into a car. (see fig. 3.)

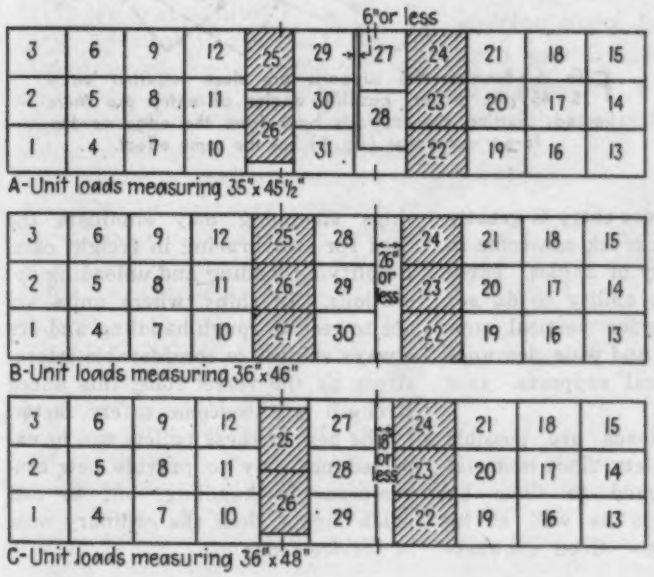


FIG. 3—Three basic carloading patterns for 35x45½-in. eight-way pallets are shown here with their loading order indicated. The shaded units should be loaded by transporter or hand pallet truck.

By permitting 35x45½-in. pallets to be handled from either side, the eight-way feature has made important contributions to truckloading. Two units can be set into a truck the narrow way or one the wide way and one the narrow, making possible many different loading arrangements, fig. 4.

Less handling space is required because a fork truck need make only a half turn from an aisle to enter the corner of an eight-way pallet. Consequently, in place of the 12-ft to 14-

FIG. 4—The eight-way entry permits rectangular pallets to be placed whichever way they fit best in a truck trailer. Two pallets abreast the wide way would not go into the van, while two the narrow way would waste space.

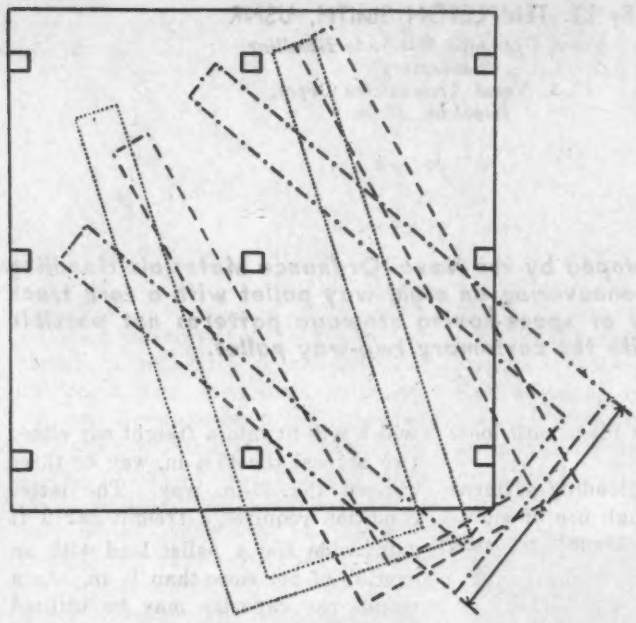


FIG. 5—If the upright supports of 48 x 48-in. eight-way pallets are no more than 2 in. square or 3 in. in diam., 4-in. wide forks can enter from a variety of angles. The corner and center supports could be slightly larger without seriously hindering accessibility, but not the other four.

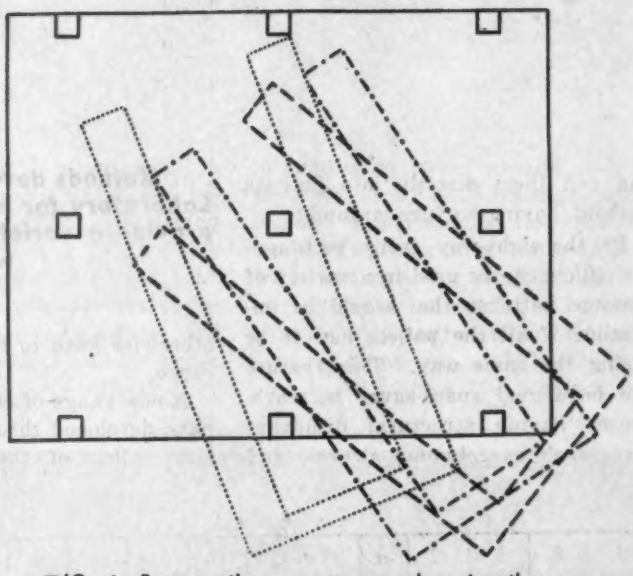


FIG. 6—Because the supports are close together on a 35 x 45½-in. pallet, possible angles of entry are more limited. Setting the supports back from the edge on the larger size pallet (fig. 5) has the same effect.

ft aisle required for a 4000-lb capacity fork truck handling two-way standard Navy 48x48-in. pallets, 7 ft are ample provided that there are cross aisles of the same width to expose the corners of some of the pallets. Where cross aisles are not desired, eight-way pallets can be handled from an 8-ft aisle provided there are occasional 4-ft gaps in the stowage to permit corner entry. After one row has been removed there will be a regular 12-ft aisle.

The value of corner entry is greatly increased if a fork truck can come in from a wide variety of angles. Three factors govern its ability to do so: narrow forks, slender vertical supports in the pallet, and wide clearance between the vertical supports. (see figs. 5 and 6.)

Stronger unit loads are possible with eight-way pallets, since material can easily be bound to them by athwartships straps as well as by fore and aft straps. Good athwartships strapping may eliminate the need for swaybracing in freight cars, simplifying loading and unloading operations. In ships, where units are apt to receive rough handling and are always subject to considerable lateral stress as the vessel rolls, this added strength is a welcome safety factor.

The best of these pallets can be expected not only to provide new conveniences in handling, but to last much longer than the ordinary ones in service today.

500,000,000 Stampings With Carbide Dies

SINTERED carbide blanking and forming dies, making use of inserts of Firth-Sterling Diecarb of a Rockwell hardness from 65 to 73, are showing excellent production performance.

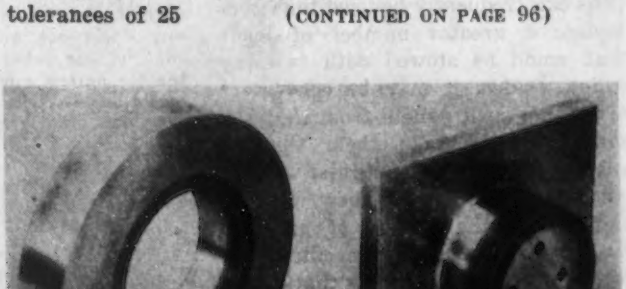
In an electrical manufacturing plant in Pittsburgh, a disk or "cookie" die approximately 4-in. in diam started work several years ago blanking a circle of silicon electrical sheet 0.025-in. thick used in rotors and stators. At latest count, this original die had completed the total of over 500,000,000 stampings. Two other similar dies were put into production, and they, too, are averaging betwen 50 and 60 million blanks per grind.

In the midwest, a plant has been making E laminations for transformers out of 0.025-in. sheet. This die had produced 1,300,000 pieces without regrinding and without the development of cutting burrs. Diemakers have had to become educated in working with carbides. The problems have been innumerable, even though the production record of the material seemed assured and the hardness of the metal seemingly was a prime asset in a craft where tolerances of 25 millionths of an inch are frequent if not commonplace.

Firth-Sterling Steel Co., McKeesport, Pa., is offering Diecarb in four grades. In addition, the company is embarking on an educational program to provide diemakers with engineering assistance covering design of the complete die, proven methods of applying the carbide to dies by brazing, shrink-fitting, press-fitting and by mechanical matrix, and recommendations on grinding.

The four grades in which Diecarb

(CONTINUED ON PAGE 96)



German Cemented Carbide Industry

. . . A description of the war-time controls set up in Germany, the standardization of carbide types for particular applications, production data, information on new production techniques, a report on a new titanium carbide-vanadium carbide, and an investigation of advances in hot pressing practices. This article is presented through the courtesy of the Enemy Technical Control Committee of the War Production Board.

o o o

By GREGORY COMSTOCK
Professor of Powder Metallurgy, Stevens Institute of Technology

o o o

AN investigation of the German hard cemented carbide industry was instituted in March, 1945. Previous to the war, a major proportion of the tungsten carbide product was made in the Ruhr, which, until the middle of April, was still partially occupied by the Germans. Two steel mills on the west bank of the Rhine, in territory occupied by the Allied troops, afforded preliminary information on the industry, which was immediately substantiated as soon as it was possible to move into Essen and the Ruhr proper.

The inspection of plants in the Ruhr was followed after V-E day by visits to other plants located in several rather widely separated portions of Germany and Austria. Key personnel were located and interviewed. Equipment and products were inspected and generously sampled for subsequent tests. Documentary evidence regarding the administration and control of the industry was collected.

Early in the investigation several facts became apparent. Captured documents, stocks and personnel unmistakably indicated the extreme importance placed on the hard cemented carbides both by the German high command and by those Nazi governmental agencies responsible for war production. It was evident that high priorities were issued to facilitate the production of hard cemented carbide for military and industrial use. Research directed towards improvements in composition, properties, production methods or the use of substitute materials was urgently demanded.

In spite of ever increasing power, labor and transportation difficulties, all of the hard cemented carbide manufacturing plants were kept operating as long as possible and were repeatedly removed from bombed areas or from those thought to be in danger of capture. The industry was meticulously reorganized under the direction of the Ministry Schacht and stringent directives were issued standardizing hard cemented carbide tools and apportioning them most carefully to those applications where they would be most effective. It was obvious that in Germany hard cemented tungsten carbide was regarded not only as material of high military strategic value but also as the most important single factor in the emergency production of the materials of war.

Early in the war the control of the industry was vested in the Hartmetallezentralle, which was originally located in Essen but moved after the bombing of that city to Dahlbruch, a small country town in the province of Siegen. In the final stages of the war, this office or the Bewirtschaftungstelle Hartmetalle apportioned raw materials to the ten manufacturing plants constituting the industry, exercised control over quality and manufacturing procedure, received all orders, regulated the shipment of the product, and was responsible for the correct application of the material to industry. To facilitate these functions, the Greater Reich was divided into five areas of regional distribution. Tools and tips were shipped to users in each of these areas from stocks located in Dahlbruch, Wernshausen (Thuringia), Langenbielau (Lower Silesia), from Dortmund, and from Weiden-Oberpfalz. According to the ex-director of the Hartmetallzentralle, the accomplishment of this control was effected in three stages, described by him in the following manner:

First stage of control

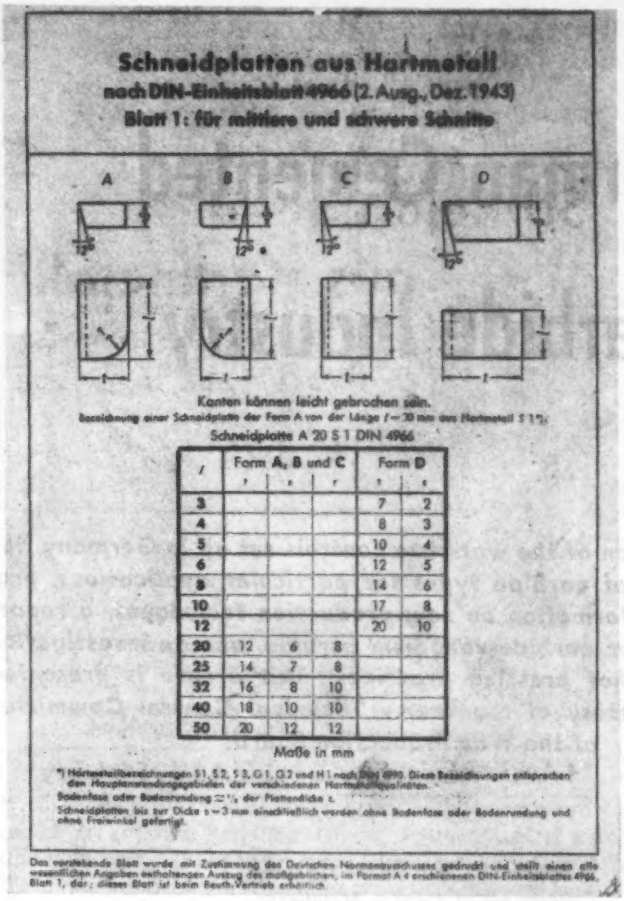
Quotas of raw materials for cemented carbides were fixed. Each manufacturer got his special quota, i.e.

	Pct
Krupp	84
Deutsche Edelstahlwerke	12
Boehler Bros.	4

These quotas were set up in relation to prewar production.

The consumers were supplied in accordance with their requirements in the last prewar year. If additional material was required a special license from the Reichsstelle fur Essen und Stahl (Iron and Steel Control) had to be furnished.

Consumers could, however, choose



Schneidplatten aus Hartmetall

nach DIN-Einheitsblatt 4966 (2. Ausg., Dez. 1943)

Blatt 1: für mittlere und schwere Schnitte

A B C D

12°

Kanten können leicht gebrochen sein.

Bezeichnung einer Schneidplatte der Form A von der Länge $l = 20$ mm aus Hartmetall S 1*):

Schneidplatte A 20 S 1 DIN 4966

l	Form A, B und C			Form D	
	r	s	r	t	s
3				7	2
4				8	3
5				10	4
6				12	5
8				14	6
10				17	8
12				20	10
20	12	6	8		
25	14	7	8		
32	16	8	10		
40	18	10	10		
50	20	12	12		

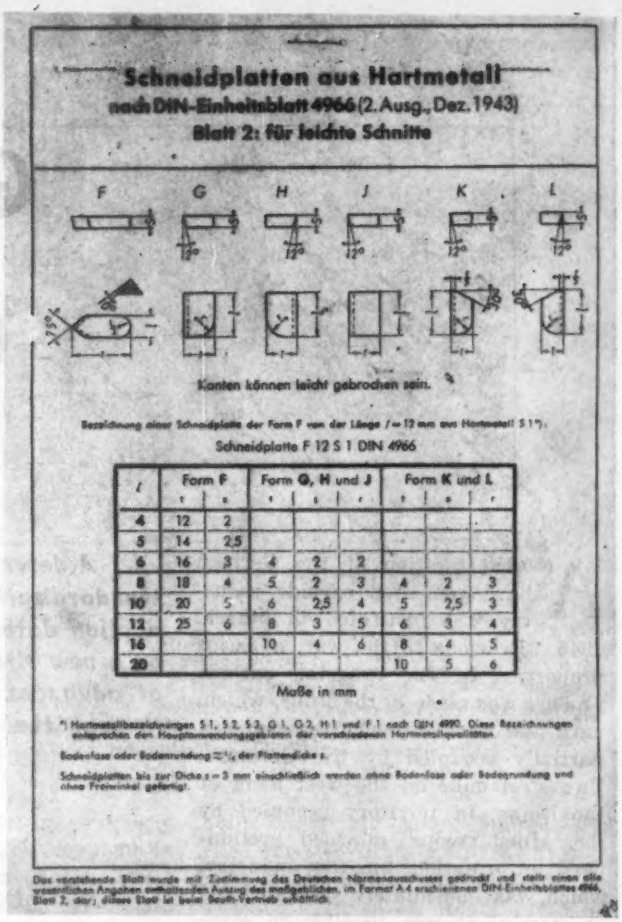
Maße in mm

*) Hartmetallbezeichnungen S1, S2, S3, G1, G2 und H1 nach DIN 4990. Diese Bezeichnungen entsprechen den Hauptanwendungsgebieten der verschiedenen Hartmetallqualitäten.

Bodenfase oder Bodenrundung ≈ 1/5 der Plattendicke s.

Schneidplatten bis zur Dicke s = 3 mm einschließlich werden ohne Bodenfase oder Bodenrundung und ohne Freiwinkel gefertigt.

Das vorstehende Blatt wurde mit Zustimmung des Deutschen Normenausschusses gedruckt und stellt einen alle wesentlichen Angaben enthaltenden Auszug des maßgeblichen, im Format A 4 erschienenen DIN-Einheitsblattes 4966, Blatt 1, dar; dieses Blatt ist beim Beuth-Vertrieb erhältlich.



Schneidplatten aus Hartmetall

nach DIN-Einheitsblatt 4966 (2. Ausg., Dez. 1943)

Blatt 2: für leichte Schnitte

F G H J K L

12°

Kanten können leicht gebrochen sein.

Bezeichnung einer Schneidplatte der Form F von der Länge $l = 12$ mm aus Hartmetall S 1*):

Schneidplatte F 12 S 1 DIN 4966

l	Form F		Form G, H und J			Form K und L		
	t	s	t	s	r	t	s	r
4	12	2						
5	14	2,5						
6	16	3	4	2	2			
8	18	4	5	2	3	4	2	3
10	20	5	6	2,5	4	5	2,5	3
12	25	6	8	3	5	6	3	4
16			10	4	6	8	4	5
20						10	5	6

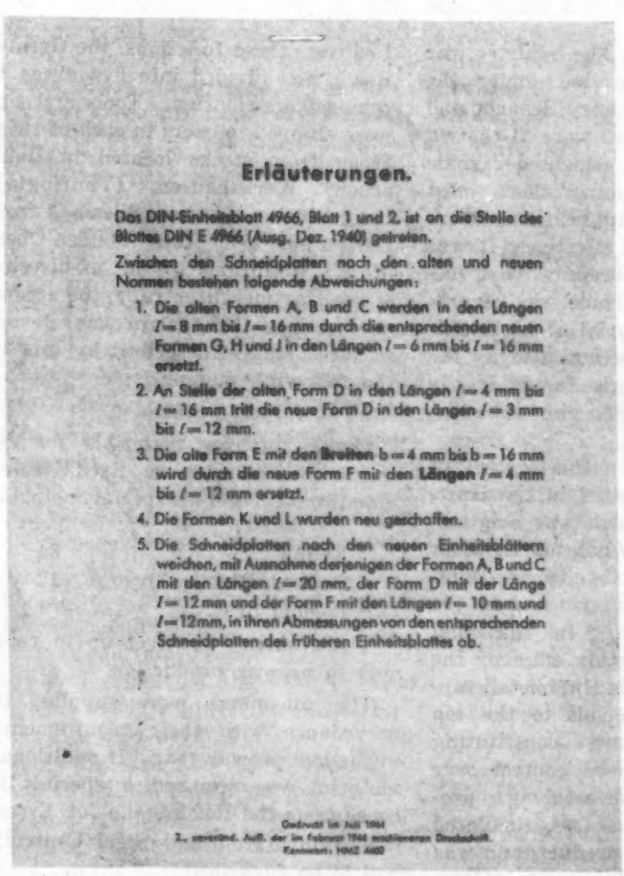
Maße in mm

*) Hartmetallbezeichnungen S1, S2, S3, G1, G2, H1 und F1 nach DIN 4990. Diese Bezeichnungen entsprechen den Hauptanwendungsgebieten der verschiedenen Hartmetallqualitäten.

Bodenfase oder Bodenrundung ≈ 1/5 der Plattendicke s.

Schneidplatten bis zur Dicke s = 3 mm einschließlich werden ohne Bodenfase oder Bodenrundung und ohne Freiwinkel gefertigt.

Das vorstehende Blatt wurde mit Zustimmung des Deutschen Normenausschusses gedruckt und stellt einen alle wesentlichen Angaben enthaltenden Auszug des maßgeblichen, im Format A 4 erschienenen DIN-Einheitsblattes 4966, Blatt 2, dar; dieses Blatt ist beim Beuth-Vertrieb erhältlich.



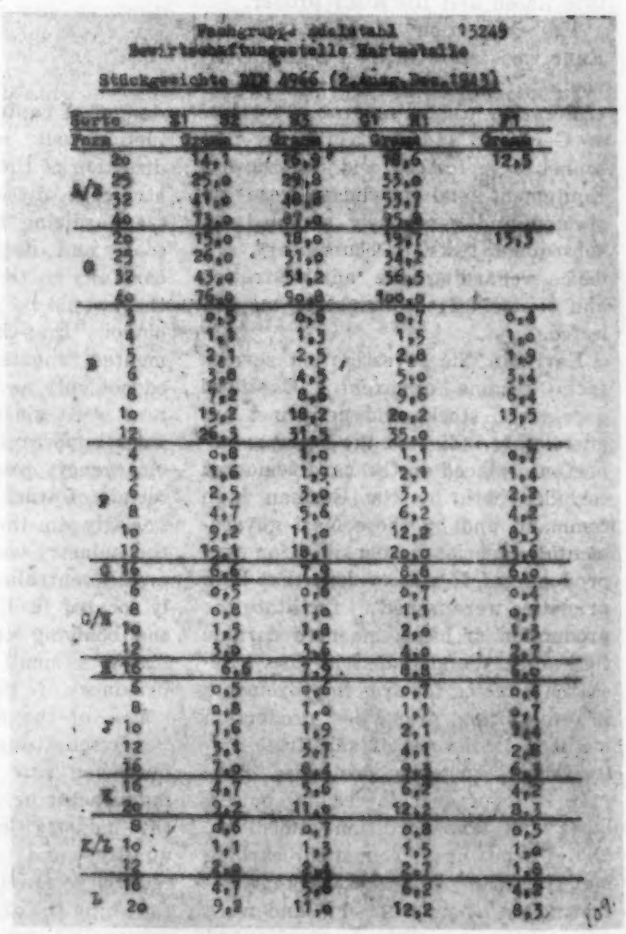
Erläuterungen.

Das DIN-Einheitsblatt 4966, Blatt 1 und 2, ist an die Stelle des Blattes DIN E 4966 (Ausg. Dez. 1940) getreten.

Zwischen den Schneidplatten nach den alten und neuen Normen bestehen folgende Abweichungen:

1. Die alten Formen A, B und C werden in den Längen $l = 8$ mm bis $l = 16$ mm durch die entsprechenden neuen Formen G, H und J in den Längen $l = 6$ mm bis $l = 16$ mm ersetzt.
2. An Stelle der alten Form D in den Längen $l = 4$ mm bis $l = 16$ mm tritt die neue Form D in den Längen $l = 3$ mm bis $l = 12$ mm.
3. Die alte Form E mit den **Breiten** b = 4 mm bis b = 16 mm wird durch die neue Form F mit den **Längen** $l = 4$ mm bis $l = 12$ mm ersetzt.
4. Die Formen K und L wurden neu geschaffen.
5. Die Schneidplatten nach den neuen Einheitsblättern weichen, mit Ausnahme derjenigen der Formen A, B und C mit den Längen $l = 20$ mm, der Form D mit der Länge $l = 12$ mm und der Form F mit den Längen $l = 10$ mm und $l = 12$ mm, in ihren Abmessungen von den entsprechenden Schneidplatten des früheren Einheitsblattes ab.

Gedruckt im Juli 1944
2., veränd. Aufl. der im Februar 1944 erschienenen Druckschrift.
Kennwort: HMZ 4460



Fachgruppe Hartstahl 13249

Bewirtschaftungsstelle Hartmetalle

Stückgewichte DIN 4966 (2. Ausg. Dez. 1943)

Sorte		S1	S2	S3	G1	H1	F1
Form		Gramm		Gramm		Gramm	Gramm
A/B	20	14,1	16,9		18,6		12,5
	25	25,0	29,8		33,0		
	32	41,0	48,8		53,7		
	40	73,0	87,0		95,8		
C	20	15,0	18,0		19,7		13,3
	25	26,0	31,0		34,2		
	32	43,0	51,2		56,5		
	40	76,0	90,8		100,0		
D	3	0,5	0,6		0,7		0,4
	4	1,3	1,3		1,5		1,0
	5	2,1	2,5		2,8		1,9
	6	3,8	4,5		5,0		3,4
	8	7,2	8,6		9,6		6,4
	10	15,2	18,2		20,2		13,5
	12	26,3	31,5		35,0		
E	4	0,8	1,0		1,1		0,7
	5	1,6	1,9		2,1		1,4
	6	2,5	3,0		3,3		2,2
	8	4,7	5,6		6,2		4,2
	10	9,2	11,0		12,2		8,3
	12	15,1	18,1		20,0		13,6
	16	6,6	7,9		8,8		6,0
G/H	6	0,5	0,6		0,7		0,4
	8	0,8	1,0		1,1		0,7
	10	1,5	1,8		2,0		1,3
	12	3,0	3,6		4,0		2,7
	16	6,6	7,9		8,8		6,0
J	6	0,5	0,6		0,7		0,4
	8	0,8	1,0		1,1		0,7
	10	1,6	1,9		2,1		1,4
	12	3,1	3,7		4,1		2,8
	16	7,0	8,4		9,3		6,3
K	16	4,7	5,6		6,2		4,2
	20	9,2	11,0		12,2		8,3
K/L	8	0,6	0,7		0,8		0,5
	10	1,1	1,3		1,5		1,0
	12	2,0	2,4		2,7		1,8
	16	4,7	5,6		6,2		4,2
L	20	9,2	11,0		12,2		8,3

FIG. 1—Four pages of the German DIN pamphlet No. 4966, showing the standard cemented carbide tips used during the war.

their supplier (i.e. Krupp, or the licensees). Furthermore, Krupp and all licensees sold cemented carbides under their own trade marks.

Second stage of control

Rationalized utilization of manufacturing capacities, each producer manufacturing specified shapes and specified qualities.

Technical supervision of consumption of hard cemented carbides, in conjunction with technical advice for saving and utilizing cemented carbides.

Dropping of all trade names; sale of material under the name Deutsches Hartmetall (German hard cemented carbide).

Messrs. Krupp and each licensee to supply certain defined consumers, so that each consumer could place his orders with one supplier only.

Formation of control distribution stores, formation of stores of DIN (standardized) shapes, so that consumers could be supplied most efficiently.

Stoppage of production in less modern factories.

Third stage of control

Establishment of Bewirtschaftungsstelle Hartmetalle (Control for Cemented Carbides).

Ascertainment of demand of individual consumer; checking of demand or motive of dual consumers.

Setting up of production plans for total demand.

Central control of actual production.

Reduction of overstocked stores to consumers.

Increase of technical education in order to achieve higher efficiency and savings in consumption of cemented carbides.

The ten manufacturing plants and their capacities were as follows:

(1) Krupp Widia Plant, Essen.
Capacity, 15,000 kg per month.

(2) Krupp Plant, Wuppertal.
Capacity, 12,000 kg per month.

Note: This was the principal powder production plant.

(3) Krupp Plant, Langenburg.
Capacity, 3000 kg per month. (Tips only).

(4) Krupp Plant, Bremen.
Capacity 8000 kg per month.

(5) Krupp Plant, Wernshausen.
Capacity, 10,000 kg per month.

(6) Krupp Plant, Langenbielau (Silesia).
Capacity, 20,000 kg per month.

(7) Deutsche Edelstahlwerke, Krefeld, moved to Dortmund.
Capacity, 3000 kg per month.

(8) Deutsche Edelstahlwerke, Reutte.
Capacity, 4000 kg per month.

(9) Gebruder-Bohlers, moved to Whithofen.
Original capacity of 3500 kg per month.

(10) Plant of Poldihütte, Prague (Czechoslovakia).
Capacity, 1000 kg per month.

During the invasion, plants (6) and (7) were either destroyed by the Allies or incompletely consolidated with other existing plants by the Central Control Agency.

o o o

FIG. 2 — Original form, showing the recommended uses and the field of application of the Deutches Hartmetalle Qualitäten as issued by the Hartmetallezentralle.

o o o

Number of Grades Limited

One of the first formal actions of the Central Control Agency was to limit the number of grades (composition or physical structure) of hard cemented carbides and to make them standard for all of the licensed manufacturers. In the same manner the number of authorized standard tips for cutting tools was progressively reduced from the 350 listed in 1937 to 41 in 1940. The final revision of these specifications was made in 1943 by the Hartmetallzentralle through the Sonderring Hartmetall und Sinterstoffe. Commenting on these final actions, the Director of the Central Office wrote, "Today (at the end of the war) about 85 pct of all metal machining is done with the small number of standard tips shown in DIN pamphlet No. 4966." This pamphlet is reproduced in its original form in fig. 1.

	Widia-Qualität	Kennfarbe der Werkzeuge	Anwendungsbereich
Für die Bearbeitung von Stählen aller Art und Stahlguß	S 1	schwarz	Für hohe Schnittgeschwindigkeiten bei Vorschüben bis 1 mm/U.
	S 2	weiß	Für mittlere Schnittgeschwindigkeiten bei Vorschüben bis 2 mm/U, insbesondere bei Verwendung älterer Werkzeugmaschinen sowie bei Arbeiten mit unterbrochenem Schnitt oder wechselnden Schnittiefen. Die Schnittgeschwindigkeiten liegen etwa 40 v. H. tiefer als die für Gruppe S 1.
	S 3	rot	Für niedrige und mittlere Schnittgeschwindigkeiten bei Vorschüben bis 3 mm/U, insbesondere für Arbeiten mit stark wechselnden Schnittiefen oder unterbrochenem Schnitt. Die Schnittgeschwindigkeiten liegen etwa 60 v. H. tiefer als die für Gruppe S 1.
	F 1	grau	Feinstdrehen und Feinstbohren von Stahl, d. h. bei Arbeiten mit sehr kleinen Spanquerschnitten und Schnittkräften.
Für die Bearbeitung sonstiger Werkstoffe	G 1	blau	Bearbeitung von Gußeisen unter 200 Brinell, Kupfer, Kupferlegierungen, Messing, Leichtmetallen, Kunst- und Preßstoffen und ähnlichen Werkstoffen; ferner zum Bestücken von Drehbankkörnerspitzen, Meßlehren, Mikrotastwerkzeugen und Gleitflächen von Führungsschienen.
	G 2	braun	Bearbeitung von Kunst- und Hartholz, Faserstoffen, verschiedenen Preßstoffen und für Schlagbohrwerkzeuge.
	G 3	blau mit schwarzem Streifen	Bearbeitung von Elektrodenkohle.
	H 1	gelb	Bearbeitung von Hartguß, Gußeisen über 200 Brinell, Gußeisen mit harten Stellen in der Randschicht, Temperguß, Glas, Porzellan, Gesteinen, Hartpapier.
	H 2	gelb mit schwarzem Streifen	Spezial-Hartguß (z. B. Ni-legierter Hartguß) über 100 Shore.

G/1320

Ten standard grades of hard cemented carbide were selected to cover the whole range of hard metal application. While they were referred to as the war grades, they were, of course, actually materials resulting from all of the research, development, production, and application experience in general which the German hard carbide industry had accumulated since its formation. Six of these grades were most widely applied to machine tooling and were supplied in the form of standard tips. These were

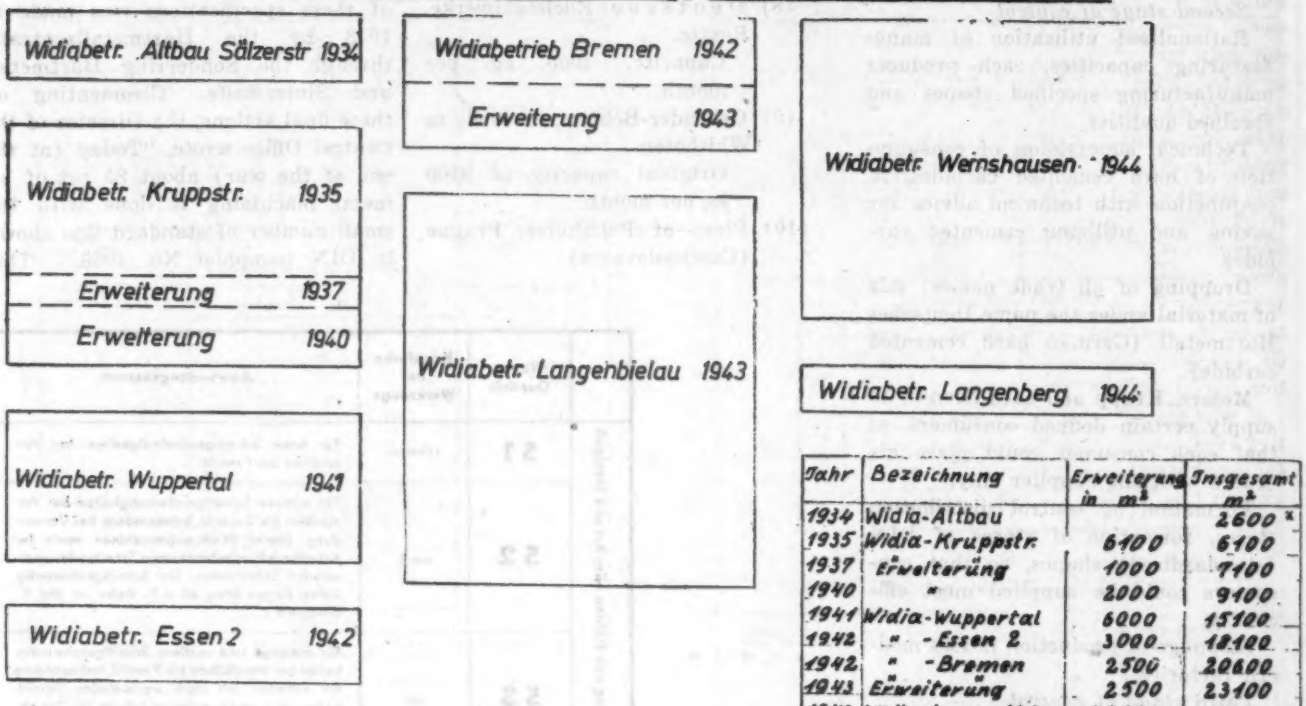


FIG. 3—Original chart showing wartime expansion of cemented carbide facilities in Krupp plants.

TABLE I

Composition and Physical Properties of Standard German Cemented Carbides

Mark	Composition	Sintering Temperature, °C	Duration of Sintering Temperature, Min Thickness of Tips		Bending Strength, Kg Per Sq MM	Elasticity Coefficient, Kg Per Sq MM	Heat Expansion Number 10^{-6} Cm Cm Per °C	Heat Conductivity, Calories Per Sec Per °C	Specific Heat	Electric Resistance
			2 MM	15 MM						
S1	78 WC 16 TiC 6 Co	1600	20	100	125	54,000	6	0.09	0.06	0.43
S2	78 WC 14 TiC 8 Co	1550	20	100	140	.....	6.2	0.08	....	0.44
S3	88 WC 5 TiC 7 Co	1500	20	100	150	59,000	5.5	0.15	0.05	0.25
G1	94 WC 6 Co	1420	20	100	160	62,000	5	0.19	0.05	0.2
G2	89 WC 11 Co	1400	20	100	180	58,000	5.5	0.16	0.05	0.18
G3	85 WC 15 Co	1380	17	60	205	.....	.....	....	....	....
H1	94 WC 6 Co	1420	17	60	160	64,000	5	0.19	0.05	0.21
H2	91.5 WC 0.5 VC 1 TaC 7 Co	1500	66	220	115	.....	5	....	....	0.25
F1	69 WC 25 TiC 6 Co	1550	66	220	110	52,000	7	0.05	....	0.65
F2	34.5 WC 60 TiC 5.5 Co	1700	66	200	80	.....	.....	....	....	0.77

grades S1, S2, S3, G1, G2 and H1. A seventh grade, F1, was also supplied in the form of certain specific tools. Requests for non-standard tips or for special compositions were discouraged and required the issue of a special permit. These grades and two-non-standard special grades, F2 and G3, have the composition and physical properties shown in table I after the heat treatment specified. The absence of hardness data is characteristic of German practice, no emphasis being placed on the hardness of these metal aggregates as indicated by resistance to permanent deformation. Grades G1 and H1 are of the same composition but of different final particle size.

It was possible to secure representative analysis of these grades as manufactured by current wartime production methods. They are shown in table II, in this case including Rockwell hardness data (A scale).

The proportions in which the most popular of these grades were produced for industry is indicated in table III, which shows the yearly output of the largest German manufacturer, Krupp. The G grades are all shown under one heading. Grade X is still under investigation; F grades are also listed as one grade or type.

Grades S1, S2, S3 and F1, F2 are primarily designed for steel cutting. The G and H grades are for cast iron, nonferrous metals and alloys and other materials. S1, S2 and S3 are of progressively increasing strength and decreasing hardness as are the series G1, G2 and G3. Grades H1 and H2 are carefully developed special grades. H1 is of almost the same calculated composition as G1 and the same strength but is materially harder. It is sintered for a shorter time and has a finer ultimate grain size. Grade H2 contains small quantities of vanadium and tantalum carbides, is the hardest standard grade produced, and is employed in the machining of extremely hard materials.

• • • The Krupp Widia plant at Essen.

Tendency to Use Columbium

Consideration of the composition of these materials, their reported physical characteristics and their recommended applications would seem to indicate an extremely well chosen group of hard cemented carbides for wide application to general industrial usage. The use of tantalum or columbium as carbide additives to hard metal has always been discouraged in Germany, possibly because of the difficulties attendant to their consistent procurement. German war research reports secured during the investigation showed a marked tendency toward the use of columbium in small but significant percentages.

In the German practice, machining grades of hard carbide are recommended on the basis of the material to be cut, i.e. ferrous and nonferrous, nonmetallic, etc.; the amount of material to be removed, i.e. depth of cut at high, medium or low speeds; the strength or cutting characteristics of the materials to be machined; the type of operation, i.e. turning, milling, boring, etc., and special considerations such as finish. On this basis grade S1 is recommended for general steel cutting, although comparatively light cuts at high speed are specified and applications are limited to machine tools capable of taking full advantage of carbide cutting efficiency. This grade is the most generally employed of all of the German hard carbide products.

Grade S2 is for heavier steel cutting than grade S1 with permissible increases in depth of cut up to 30 pct of those recommended for S1. S3 is recommended for still heavier cuts, for intermittent machining operations and for use in old machine tools. Grade G1 is the original Schröeter composition refined by production experience and research. It is recommended for the machining of cast iron, copper, the light metals and a variety of other materials. It is used in quantities second only to Grade S1.

G2 and G3 are recommended for progressively heavier cuts of the G1 type, for operations involving increasing resistance to shock or impact. The F types were developed for such special uses as the boring of aircraft cylinders or other similar applications

• • • Automatic machine tool, Widia test laboratory, at Krupp, Essen.

• • • Widia test lathe in the Krupp laboratory, Essen.

TABLE II

Representative Analyses of German Cemented Carbides Produced During the War

Grade S1		Grade S2		Grade S3	
C		C		C	
ges.	7.57	ges.	7.30	ges.	6.17
frei	(0.21)	frei	(0.22)	frei	(0.16)
W	73.33	W	73.06	W	82.55
Co	5.48	Co	7.64	Co	6.63
Ti	12.76	Ti	11.13	Ti	3.77
Fe	0.31	Fe	0.28	Fe	0.25
Cr	0.03	Cr	0.05	Cr	0.05
Ni	0.10	Ni	0.11	Ni	0.09
N_2	0.26	N_2	0.29	N_2	0.15
spez. Gew.	11.15	spez. Gew.	11.25	spez. Gew.	13.30
Harte	91.0	Harte	90.5	Harte	90.0

Grade G1		Grade G2		Grade G3	
C		C		C	
ges.	5.90	ges.	5.65	ges.	5.50
frei	(0.15)	frei	(0.18)	frei	(0.32)
W	87.75	W	83.22	W	79.32
Co	5.68	Co	10.46	Co	14.46
Fe	0.34	Fe	0.38	Fe	0.40
Cr	0.09	Cr	0.05	Cr	0.06
Ni	0.10	Ni	0.12	Ni	0.10
N_2	0.06	N_2	0.03	N_2	0.03
spez. Gew.	14.70	spez. Gew.	14.20	spez. Gew.	13.70
Harte	90.0	Harte	88.5	Harte	87.0

Grade H1		Grade H2	
C		C	
ges.	5.83	ges.	5.83
frei	(0.12)	frei	(0.16)
W	87.82	W	85.14
Co	5.66	Co	6.80
Fe	0.30	Fe	0.28
Cr	0.05	Cr	0.06
Ni	0.11	Ni	0.11
N_2	0.03	Ta	0.77
spez. Gew.	14.75	V	0.5
Harte	91.0	Nb	0.20
		N_2	0.03
		spez. Gew.	14.40
		Harte	91.5

Grade F1		Grade F2	
C		C	
ges.	8.10	ges.	12.8
frei	(0.06)	frei	(0.05)
W	66.86	W	32.40
Co	5.48	Co	5.25
Ti	18.30	Ti	46.60
Fe	0.40	Fe	0.71
Cr	0.13	Ni	0.14
Ni	0.15	Cr	0.10
N_2	0.42	N_2	1.14
spez. Gew.	9.90	spez. Gew.	6.8
Harte	91.5	Harte	92.5

TABLE III

Production of Various Cemented Carbide Grades by Krupp (All Figures in Kg)

	Titanium-Free			Titanium-Containing					
	G	H1	H2	X	S1	S2	S3	F1	Summe
1926 to 27	1,074								1,074
1927 to 28	2,671								2,671
1928 to 29	8,992								8,992
1929 to 30	12,535								12,535
1930 to 31	10,565								10,565
1931 to 32	6,450			1,021					7,471
1932 to 33	8,572			1,341					9,913
1933 to 34	11,904			2,591	241				14,736
1934 to 35	15,132			884	5,897				21,913
1935 to 36	20,583			448	11,947				32,978
1936 to 37	21,239	9,749		526	22,076				53,590
1937 to 38	23,638	11,130		310	23,784	3,129	640	2	62,633
1938 to 39	28,887	12,780	76	185	28,688	5,698	5,576	74	81,964
1939 to 40	38,109	15,997	233	308	47,694	9,783	12,667	298	125,089
1940 to 41	41,076	17,963	442	69	47,246	16,853	18,002	397	142,048
1941 to 42	55,905	24,778	1,120	.....	65,334	24,806	23,868	547	196,358
1942 to 43	58,303	24,666	1,431	.....	112,324	39,580	34,868	714	269,886
1943 to 44	99,423	35,668	819	.....	210,354	81,149	80,596	1,177	509,186

where light cuts of long duration and extremely fine tolerances are involved which permit of little or no tool-end wear (F1). Another example cited of the advantageous use of these grades is the close tolerance machining of from 500 to 700 connecting rods per grind, using F1. H grades are recommended for the machining of either naturally hard alloys or those in the hardened state as a result of heat treatment. For surfacing or shaping operations, S grades are recommended for steel, G grades for iron and a variety of other crisp cutting materials.

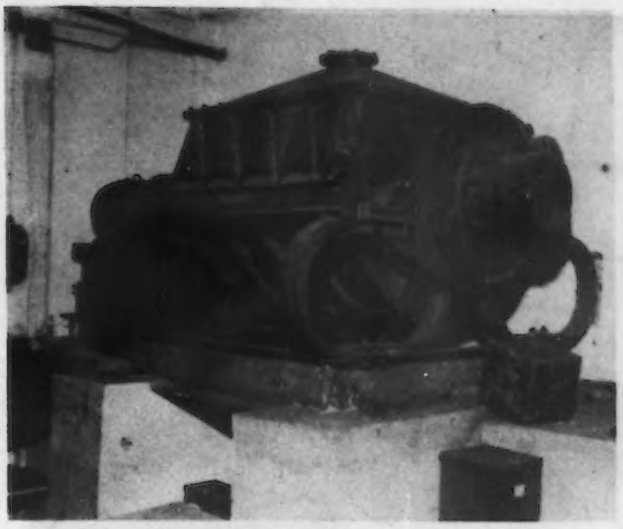
How these grades, prepared in the German method, would perform when applied to the various conditions prevailing in the Allied metal working industries can only be ascertained by the laboratory and field trials which have been recommended.

Fig. 2 shows, in its original form, the recommended uses and the field of application of these Deutches Hartmetalle Qualitäten as issued by the Hartmetallezentralle.

In order to adequately evaluate these grades and to compare them with corresponding U. S. products, it will be necessary to apply them to carefully conducted comparative tests, preferably in the development laboratories of American and British hard carbide producers, and to conduct actual field trials of the German products in Allied industry. While it is believed that U. S. products are in no way inferior, but on the contrary are made from more carefully prepared and superior raw materials by methods better calculated to produce uniformity and high efficiency performance, it is felt that such a direct comparison of the two processes and products should be made if only to demonstrate that fact. German industry was not operative either during or after this investigation and the actual performances of these materials could, therefore, not be observed and reported upon. Extremely large stocks of all of the standard and many of the special grades and tips have been secured and are available for Allied examination.

Before the war, German tool and machine practices differed quite materially from U. S. technique. The German tools were larger and were held more rigidly. The carbide tips were larger. There were more skilled hand operations involved in their practices than in American mass pro-

• • • High-temperature sintering furnace at Krupp, Wernshausen.



• • • Large vibratory mixer at Krupp, Widia Wernshausen.

duction methods. Hard metal was more generally employed and was possibly treated with more care than accorded to the first applications in the U. S. The investigation indicated that these differences were by no means so great at the end of the war as they were before it. An effort had obviously been made to duplicate or even to improve upon U. S. machine and tooling practice. No doubt this was considerably assisted by the employment of a Detroit-trained tool engineer of marked ability as designer and application executive for the Hartmetallezentralle. His recommendations, backed by the full force of the government directives creating Central Control for hard carbides, were promptly put into general practice. The opportunity presented by these circumstances for a general overhauling and standardization of German tool practice was unique and apparently every advantage was taken of it.

The wartime expansion of the German hard cemented carbide production capacity can perhaps be judged most readily by an examination of a chart showing the square meters of work space devoted to manufacturing carbides and carbide products, again using Krupp as index of the industry. Such a chart is shown in its original form in fig. 3. It will be noted that the major increases occurred in the period from 1941 to 1944 and that the years 1943 and 1944 greatly increased capacity.

The method employed in the manufacture of each of the standard grades of Deutsches Hartmetalle has been carefully studied in detail from the ore to the finished product. Adequate samples have been taken in duplicate at each one of the significant manufacturing steps. Equipment has either been photographed, sampled or both. Official descriptions of these procedures have been required from the German key technical operating personnel and are on record. As soon as they have been cleared officially they will be made available to those interested.

Improvements in Manufacture

Reporting on the most notable improvements in the manufacture of hard cemented carbides over the last twelve years, technical executives of the Hartmetallezentralle list the following:

"Before 1936 the mixing of metallic tungsten powder with sugar carbon or graphite was done in 8-liter drums. After that time, ball mills made by Messrs. Rohrbach with a diameter of 150 mm and a length of 250 mm were employed which permitted mixing charges of 250 kg.

"The mixture of tungsten and carbon was originally tamped into carbon boats previous to carburization. Since 1939 this mixture has been pressed into briquettes in hydraulic presses under conditions giving them

o o o

• • • Small vibratory ball mill at Krupp, Wernshausen.

o o o

o o o

• • • preliminary vacuum drying of wet ball-mill charges, Krupp, Wernshausen.

o o o

sufficient green strength to be handled. They are then inserted in this compressed form into graphite containers. This method saves labor and has the further advantage of affording better carburizing and an increase production per furnace has been made possible.

"Before 1931 carburizing was accomplished in gas-fired furnaces. Electric furnaces were employed after that date. These furnaces are of the graphite tube-resistance type. The length of the carburizing furnaces has been increased from the original 930 mm to 2000 mm in the course of the last few years. This increase in the length of the uniformally heated high-temperature zone permits a higher stoking rate and the output per furnace has been tripled.

"The crushing of the carbide cake previous to 1938 was a hand operation. Since that time the cake has been broken into coarse chunks in jaw crushers and reduced to fine powder in impact mills.

"In order to increase the output of the Essen works, a 175-liter milling mechanism was put into operation instead of those of 8-liter capacity used up to 1940. The charge of carbide plus binder metal in these machines is now 250 kg. Another marked improvement was the introduction of the oscillating or vibrating mill for the grinding of graphite or sugar carbon as well as the grinding of carbide plus binder. This was done in 1939 and 1940. The milling time in this type of mill is only a fraction of that required for the standard rotating ball mill. The milling time in the oscillating mill is one-sixth of the time required in the standard ball mill when charges of carbide plus binder are treated. Graphite or sugar carbon is pulverized in these mills with porcelain balls. Steel balls are used for blending tungsten and carbon in this mill and hard carbide balls are employed for grinding tungsten carbide plus metal binder. In 175-liter mills, 300 to 500 kg of hard cemented carbide balls of 25 and 40 mm diam are used. The hard cemented carbide balls are hot pressed.

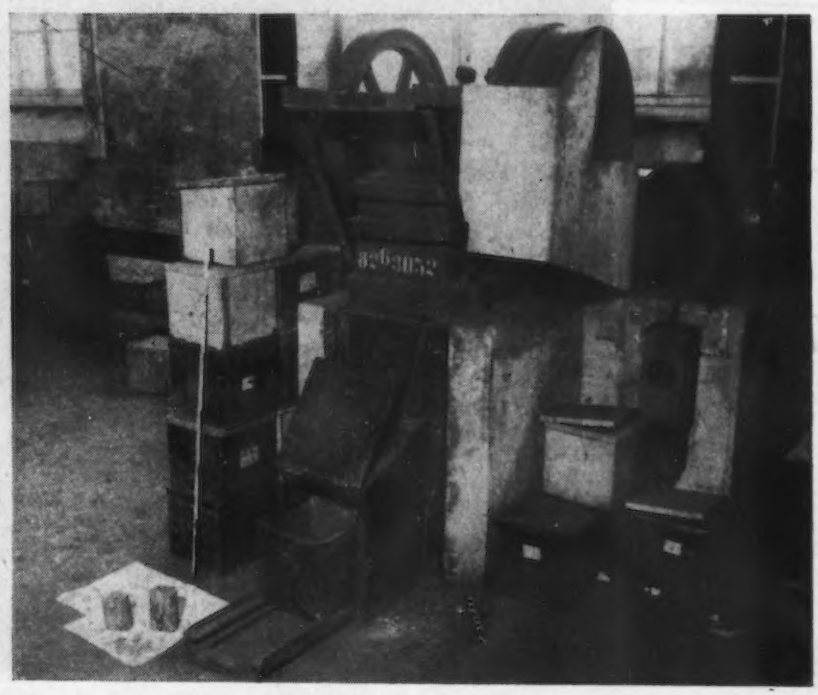
"In 1941 a new system was installed for drying the wet-ground carbide plus binder mixtures. This consists of applying a low vacuum to the mills when they are immersed in a water bath heated to 80°C. This removes practically all water in a relatively short time and does not involve the use of hydrogen. The vacuum-dried powder is, however, rapidly reduced at 600°C by stoking it through multiple tube hydrogen furnaces.

"Previously the mixed powders ready for pressing were moistened in small quantities with a sprayer and then mixed by hand. After 1938 this operation was performed in a mixing machine of 10 kg capacity. As a moistening agent, Krupp has recently used acetone or Glycol or methyl alcohol as well as the old solution of camphor and benzene (70 g of camphor to 1 liter of benzene; 350 cu mm of this solution used for 10 kg of the pressing mixture). Glycol was particularly successful as a moistening agent.

"The pressure required for titanium grades is 50 to 100 kg per sq cm. For G grades, 80 to 120 kg per sq cm, and for H1 and H2 100 to 120 kg per sq cm. For these latter grades the pressure has to be higher because the height of these mixtures as poured into molds is greater than that of the G grades and, therefore, higher pressure becomes necessary if the compressed product is to have the same weight size ratio as the G types.

"With the advent of standardized tips, improvements were possible in their pressing. The German practice

• • • Jaw crusher for tungsten carbide.



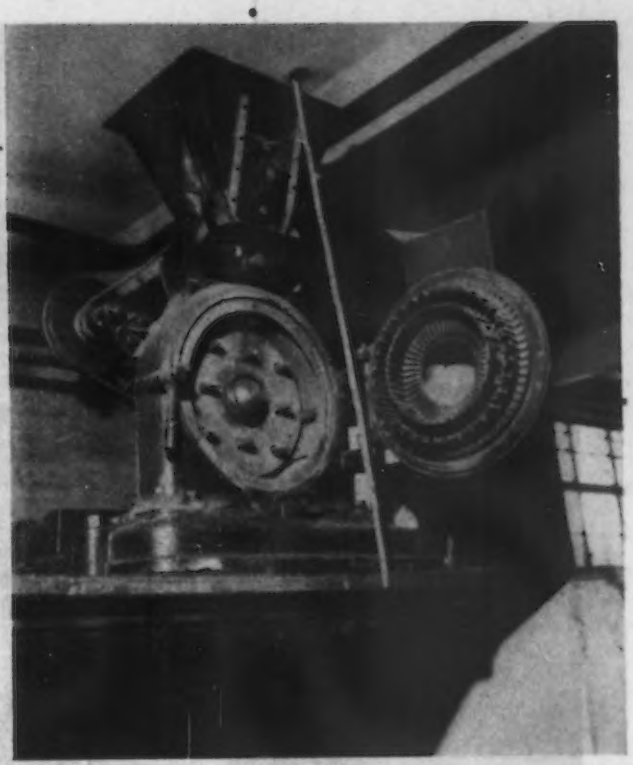
is to press in hand-powered presses one tip at a time, which is much faster than might be expected. In one of the plants 200,000 tips per month were produced from prepared powders with approximately 30 employees engaged in all operations.

"In 1940 a major change in the methods of producing tungsten carbide plus titanium carbide compositions was effected (grades S1 and S2). Originally tungsten carbide, titanium carbide and cobalt or nickel powders were wet ground, dried, lubricated and subsequently pressed and sintered. The method employed at Reutte of heating the mixed carburized powders to high temperature was thoroughly investigated. It was found that a more homogenous mixture was obtained and a possible improvement in the contorl of crystal growth was noted. In the manufacture of grades S1 and S2, mixtures of tungsten carbide, titanic acid and carbon are heated to 1700°C as a substitute for the Reutte process. The temperature required for most efficiently carburizing titanium carbide (in the German practice) is in the neighborhood of 2300°C. The advantages of this innovation are the elimination of previous milling operations applied to the individual carbides; the use of lower temperatures which greatly prolongs the life of the furnace; increased homogeneity and control of ultimate particle size; and increased production per unit of milling and furnace equipment.

"A composition change was made in grades S2 and S3 in order to increase the differences in physical characteristics between them and thereby permit a broader spread of application. The titanium carbide content of S2 was lowered by 2 pct and the cobalt content of grade S3 was increased from 6 to 7 pct.

"Krupp special grade H167 (later classified as Deutches Hartmetalle H2) was developed in 1938 for the machining of chilled molds of over 90 Shore hardness. In the same year, grade F1 was produced for the fast finishing of steel. During the war, grade F2 was developed to permit a further increase in cutting speed over that made possible by grade F1.

"The possibility that stocks of tungsten available for hard cemented carbide might be exhausted should the war be indefinitely prolonged induced concentrated research at the beginning of the war for a tungsten-free hard carbide cutting material. The experiments were successful and culminated in a titanium carbide—vanadium carbide substitute for S1. Tool tips of this material have for some time been used in mass production factories under conditions where grade S1 tips were previously employed. This grade is called V814 and its composition is 45 pct titanium carbide, 45 pct vanadium carbide and 10 pct nickel or 7 pct nickel and 3 pct cobalt. It is generally hot pressed although it can be made by the cold press vacuum sintering method." (Note: This grade is still under investigation and large numbers of tips have been secured for actual test in the United Kingdom and the U. S.)



• • • Hammer mill for pulverizing tungsten carbide, Krupp, Wernshausen.

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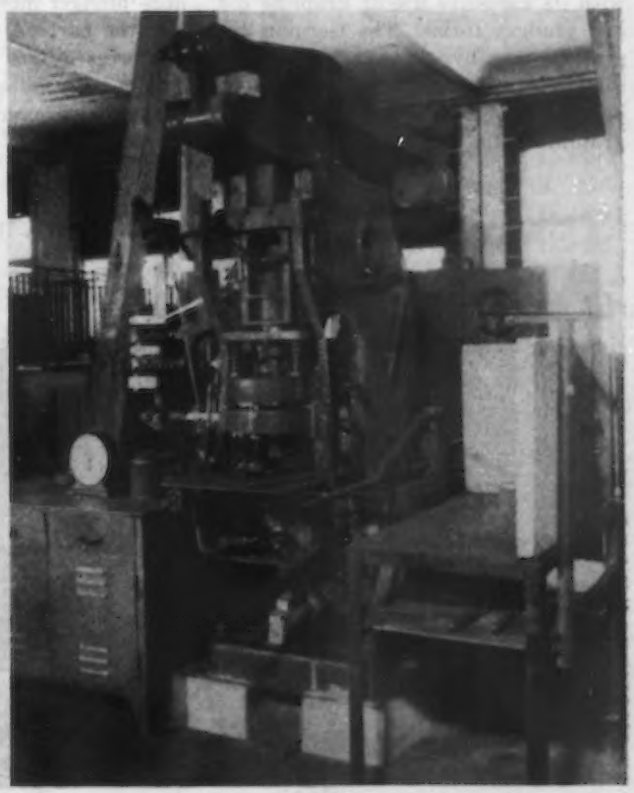
Hot Press Efficiently Used

Seven years of consistently good engineering have brought the metal



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• • • Hot press at Krupp, Essen.

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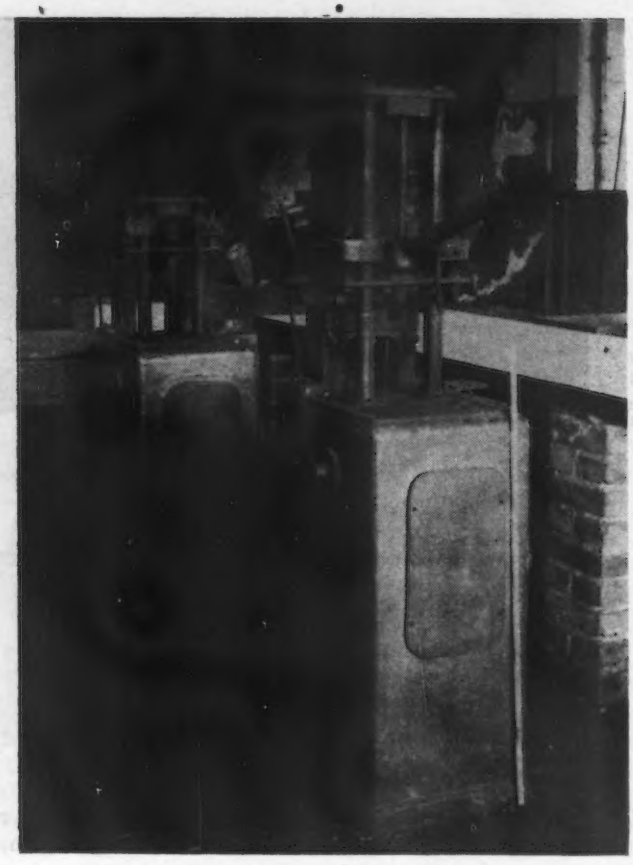
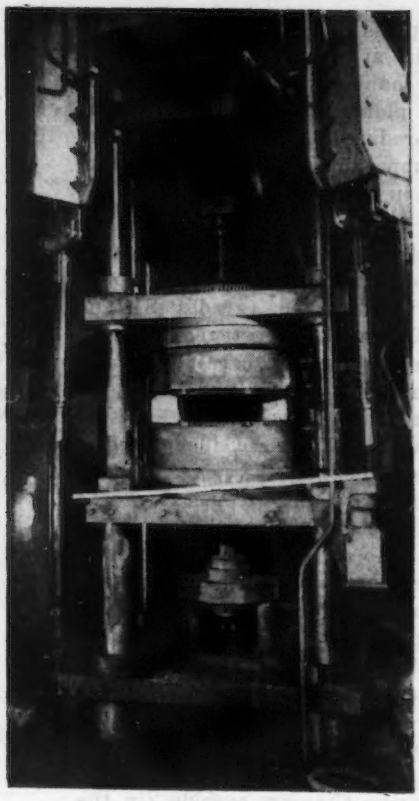


• • • Device for charging graphite molds for hot pressing, Krupp, Essen.



• • • Large new hot press at Krupp, Essen.

powder hot press to a high state of perfection in Germany. It was found in use as an efficient hard carbide production implement. One of the chief difficulties experienced in the past with this device was associated with its excessive use of graphite die and plunger forms. The German engineers have bypassed this disadvantage by pressing thin-walled cylinders or other tube forms broached from graphite into heavier graphite mold containers. These units are replaced after use with a minimum discard of reclaimable graphite. Plungers are remachined to original contours by form cutters with little loss of either time or material. In order to minimize plunger movement during pressing, the carbide plus binder powders are pressed into the temporarily reinforced graphite molds under heavy hydraulic pressure previous to hot pressing.

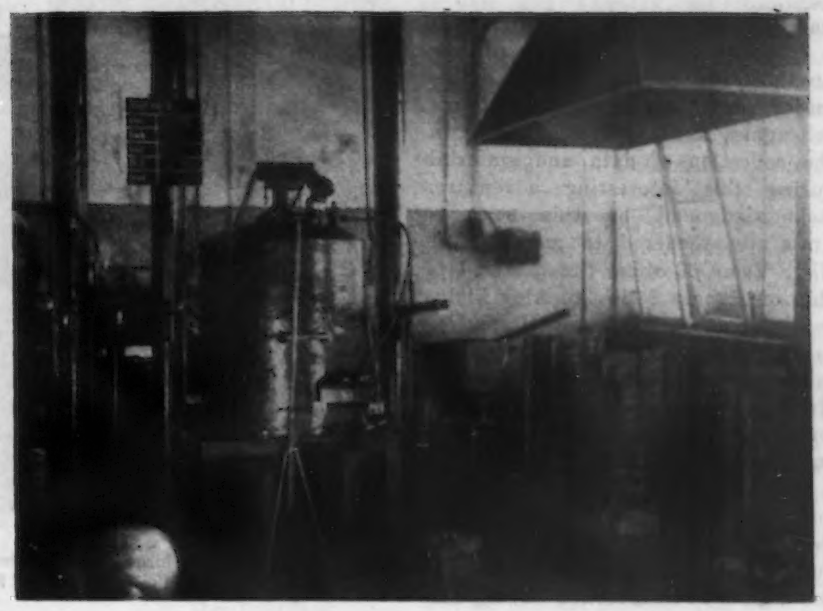
• • • Plant of Metallwerk-Plansee, Reutte, Tirol

The German hot press is of the graphite resistance type, the spring clamped mold being the resistor with a separate mechanical or hydraulic system available for applying top and bottom plunger pressure. A corps of expert electrical, mechanical and metallurgical engineers have followed this hot press development to a conclusion and have been successful in designing a most ingenious series of auxiliary machines for the mass production of mold, plunger and separator forms and for the grinding and finishing of the product. The result has been a system of hot pressing rather than the improvement of the hot press as a unit device.

The advantages of employing the hot press as a means of quickly and inexpensively producing very large objects of hard cemented carbide or of a limited number of pieces of intricate cross-section have been recognized in the U. S. for a long time. These assets have been carefully retained in the German practice. One of the difficulties associated with the simultaneous application of great heat and even relatively low pressure has been the loss of the molten binder by extrusion. The Germans report that they have in a measure overcome this by controlling the final volume of carefully weighed prepressed charges

having a constant apparent density. A consistent and controllable binder loss on the order of 2 pct is mentioned for hard carbide compositions having oirginally as much as 13 pct of the auxiliary metal. The production cycle of this system is calculated to produce a finished hot pressed mold charge in from 3 to 7 min for pieces from 50 to 1000 g in weight. Larger objects, of course, require a longer time. As many as 19 200 to 300-g pieces have been pressed in one mold in production quantities. It would seem that while the German hard carbide industry has apparently nothing comparable to the new American cold extrusion process, they have made a most notable improvement on hot pressing apparatus and technique. This system certainly merits close Allied study and further intensive investigation both at home and in Germany.

The actual physical condition of the industry at the time of the surrender is difficult to describe or to intelligently evaluate. Many investigators returning from Germany have stated that the particular industry they have inspected could be put back into operation in a relatively short time. Certainly such is the opinion of the German operators themselves. In many cases this may be true. In making such a statement, however, it should be recognized that the entire physical condition of Germany is violently upset at the present time. Transportation, power, the common services and labor together with all auxiliary manufacturing are so badly disrupted that, until they are reorganized and something even slightly resembling normality returns to Germany, it does not appear that production can be expected to proceed in an orderly fashion. Bombed plants can and probably will be cleaned up, new buildings erected and the damaged and undamaged equipment reassembled for renewed production. However, when consideration is given to the delays in the enlargement of the U. S. emergency production which were caused by failure to secure promptly a valve or a part or some material which could previously be obtained from local stocks, there is some wonder as to what delays will be found unavoidable in reassembling German industry, providing that is decided upon. There is no reason to doubt that the hard carbide industry could be put back into full production, probably in a few months' time, if the other industries of Germany and its economy were functioning on a prewar basis.



• • • Induction-vacuum carburizing and sintering, Plansee, Reutte.

The ten principal manufacturing plants of the carbide industry are physically in every possible variation of condition from those which are absolutely untouched and can be put into full operation at a moment's notice to those which have been so badly damaged that almost every piece of equipment must either be discarded or subjected to major reclamation. In this industry, as in many others, it has been found surprisingly enough, that when the walls and roof of a factory have been bombed flat and everything has fallen down on the equipment, the heavier apparatus itself can survive with relatively little damage. A German rolling mill superintendent, showing a party of American and British technical intelligence officers his prize mill and necessarily peering at it through a maze of fallen roof, girders and collapsed brick work, said, "This mill is entirely operatable—it is only slightly disarranged." A similar remark might be as fittingly applied to the German hard cemented carbide industry.

Acknowledgments

The author's most grateful acknowledgment is proffered to Howland Sargeant, Dwight Prouty, Arthur Greaves-Walker, Donald Keyes and their staffs, and also to George Powell, H. C. L. Miller, Robert F. Mehl and the United States Embassy (F.E.A.) Secretariat, London, for making this investigation of the German hard carbide industry a possibility. The assistance and encouragement of Dr. R. Genders, M.S. (British), C. S. Brice, M.S. (British), Col. Paxton-Petty, M.S. (British), Col. E. D. Raff, U. S. Airborne Inf. (Sector Commander, Essen) and of Col. Quinn and Lt. Col. Corey, U. S. Ord-

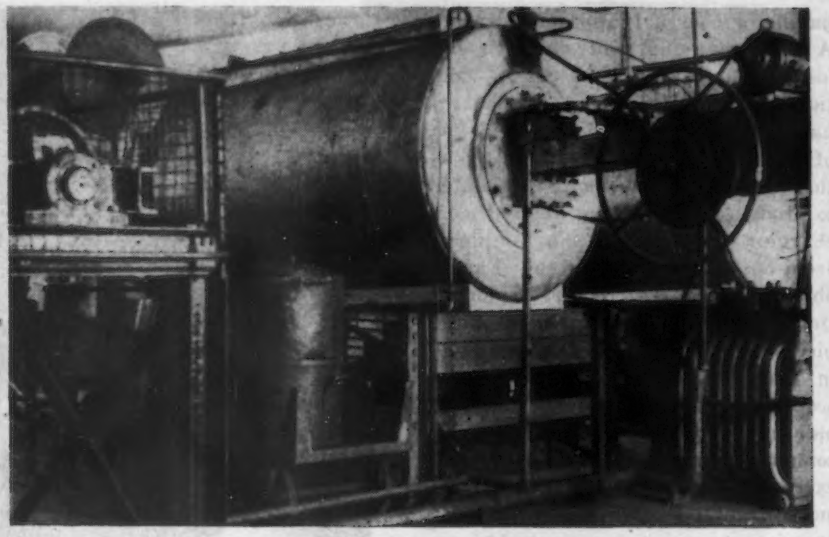
(CONTINUED ON PAGE 36)

• • • Large molybdenum-wound hydrogen sintering furnaces, Plansee, Reutte.

nance, is also gratefully recognized.

It would be inadequate to concede anything less than recognition of the major part played by the author's colleagues, associates and friends in the collection of data and material during this interesting adventure. Acknowledgment of this sort is gratefully tendered to members of CIOS Team 88 under the able leadership of Hubert Smith, to Alex Field, to Major P. J. Patterson (Canada), to Lt. Col. Kemble, U. S. Ordnance, to Martin Fleishman, to Sgt. Richard Hawley (an excellent photographer), and Pfc. Dale Smith, the best three quarter ton truck driver in the E.T.O.

Nor, in the author's personal opinion should recognition be withheld for the cooperation given the investigators by many of the German scientists and engineers interviewed during the course of this survey. Dr. Prof. Edward Houdremont, Dr. E. Ammann, Dr. Richard Kieffer, Dr. Werner Hotop and Herren Heine and Barth of the German hard carbide industry freely accorded cooperation when they could easily have been either misleading or evasive under what must have been for them the most trying and discouraging of circumstances.



• • • Close-up of large molybdenum-wound hydrogen sintering furnaces, Plansee, Reutte.

Porosity and Shrinkage in Nonferrous Castings

ANY economic advantages of the casting process over other methods of fabricating metals and alloys can be sustained only if the casting is made uniformly sound with good mechanical properties. A large number of variables may influence the soundness of a casting, and for many years founding was an art rather than a science, since the appreciation of the effects of these variables in individual castings was very largely dependent on the foundrymen's experience, and the quality of the product was mainly determined by their skill.

The quality of castings is still to some extent dependent on the skill of foundry operatives, but modern mass production methods and, more particularly, the increasingly heavy demands on castings for vital engineering components, have lead to increasingly strict scientific control. This is mainly directed to control of shrinkage and gas effects. A survey of the results of various researches on these effects in castings of nonferrous metals and alloys was conducted by the British Nonferrous Metals Research Association and incorporated in a report by W. A. Baker.

According to this report, the most obstinate sources of defects in castings are the volume changes in metals, especially the shrinkage occurring during solidification, and the absorption and liberation of gases from metals. Five principal factors are involved in the formation of shrinkage defects. These are:

(1) The magnitude of the volume change, especially of the freezing shrinkage. Internal porosity or external shrinkage defects occur unless freezing shrinkage is adequately compensated by the flow of feeding liquid to the zone of solidification, and the extent of the flow required is smaller, the smaller the freezing shrinkage. Similarly hot tears and internal stresses are promoted by high freezing shrinkage and high solid shrinkage.

(2) Temperature gradients in the casting. Steep temperature gradients promote flow of feeding liquid from the hotter to the cooler parts of the casting, and in the general case of castings freezing in more than one direction, it is essential that the longitudinal temperature gradient, that is, the gradient in a direction parallel to the mold walls, be steep enough in relation to the lateral temperature gradient (the gradient in a direction normal to the mold walls). To meet this condition the overall rate of solidification must be at a value such that sufficient time is available for heat-flow from the feeders and to the chills provided to establish and maintain a sufficiently steep longitudinal gradient. If the overall rate is above this value, the metal adjacent to the mold walls feeds at the expense of the central part of the section, and the latter is not properly fed by the feeders, since insufficient time is available for the required flow of heat, and hence of feeding liquid. If the overall rate of solidification is too low, conduction through the metal tends to smooth out both lateral and longitudinal temperature gradients, and there is neither good lateral nor good longitudinal feeding.

The optimum rate of solidification varies with the form of the casting and the metal cast, being highest where the form of the casting permits a steep longitudinal gradient to be easily established and also where the metal has a high thermal conductivity.

(3) The factors in the casting process which influence the temperature gradients in the casting are: (a) Sectional thickness of the casting as a whole and local variations in thickness at various parts of the casting; (b) relative volumes and shapes of the feeder and the casting; (c) thermal capacities and thermal conductivities of the metal and mold material; (d) freezing temperature (or range of temperature) of the metal; (e) pouring temperature and mold tem-

perature; (f) method of filling the mold, and (e) pouring speed.

Of these factors (a), (c) and (d) are determined by the design of the casting, the metal used and the molding material available. Hence the desired conditions of solidification must be secured by control of factors (b), (e), (f) and (g).

(4) The efficiency of feeding and the form and distribution of shrinkage porosity or external cavities may be largely influenced by other properties of the metal including: (a) Constitution of the alloy; (b) mode of crystal growth and grain size; (c) physical properties of the feeding liquid, in particular its viscosity and the surface tension of the residual liquid between the primary crystals.

Of these factors (c) is probably not amenable to control and (b) is largely determined by the metal used, although grain size is frequently controllable. The constitution of the alloy is probably the most important of these factors, but the choice of an alloy may be governed by other considerations, such as mechanical properties obtainable from the alloy. Where possible, however, metals or alloys should be used in which a eutectic (or other constituent freezing at constant temperature) predominates since it is least susceptible to hot tearing and interdendritic fissures which reduce mechanical strength.

(5) Design of the casting and rigidity of the mold, together with those enumerated in (2), (3) and (4) influence the incidence of hot tears and internal stresses.

Of all the variables in the casting process, the method of filling the mold is the most important one which may be conveniently varied to produce the desired conditions of solidification. It is impossible to specify a universally applicable method of running; each casting must be treated individually, but it may be taken as a golden rule that the method used should be such that the first poured metal is located in the parts of the casting removed from the feeder where it will soon become cold, and the last poured metal will remain hot in the feeder and adjacent parts of the casting. Direct pouring at a controlled rate through bushes located above the feeders is strongly recommended; where drossing difficulties make this impractical, the middle-running, side-running or inversion method should be used to promote directional solidification at bosses, junctions of section and changes of section, by the use of chills, in order that a smooth temperature gradient between the feeder and the remote parts of the casting may be established and maintained throughout solidification.

The primary object of this recommendation is to eliminate or minimize internal shrinkage porosity and external shrinks, but these measures will also materially reduce the risk of other shrinkage defects, such as hot tears and internal stresses, by reducing differential contraction stresses to a minimum.

Gas Porosity

The sources and effects of gas porosity as given in the report are in brief:

(1) Element gases, notably hydrogen, may be dissolved by the molten metal and liberated again during solidification, with the resultant formation of gas-filled cavities in the casting. The solubility of hydrogen in most cases decreases abruptly at the change of state from liquid to solid, and the gas liberated at this stage is particularly liable to be trapped in the casting. The solubility of the gas is proportional to the square root of its partial pressure, and a number of degassing procedures utilize this fact, the partial pressure of hydrogen being reduced to a very small value by treating the metal with an inert gas. The gas is thus removed by a scavenging process.

(2) Compound gases, notably water vapor and oxides of carbon and sulphur, or their component elements may exist in solution in the molten metal, and the gas may be liberated during solidification. The resulting porosity is generally termed reaction-gas unsoundness. The rate of diffusion of these gases through metals is believed to be much lower than that of hydrogen, and consequently compound gases are more likely to be trapped in the casting and to give rise to porosity than in hydrogen. In all established cases oxygen is one reactant present in the melt, and the concentrations of the constituent elements of the compound gas in the metal obey the mass action law. An excess of one reactant, therefore, displaces the other, and vice versa. This fact is utilized in degassing treatments involving oxidation and deoxidation, an excess of oxygen being added to expel the other reactant, and a moderate excess of harmless deoxidant being subsequently added to remove the excess of oxygen from the melt.

When a melt contains an excess of an element with a high affinity for oxygen and forming an insoluble oxide, the solubility of oxygen may be reduced so far that no reaction-gas unsoundness can occur, and in such cases hydrogen, carbon and sulphur cannot be removed by oxidation. There may be intermediate cases, however, where sufficient dissolved oxygen may be present to cause reaction-gas unsoundness, but the solubility of the oxygen is so low that the other reactant cannot be expelled by oxidation in a reasonably short time. In such cases, and where the oxygen solubility is practically nil, non-volatile reducing elements, such as carbon and sulphur, cannot be removed except by treatment of the melt with substances having a high affinity for these elements, but volatile elements notably hydrogen, can be removed by the scavenging process, that is, passing an inert gas through the melt.

(3) The gases may derive from the furnace atmosphere to which the metal is exposed during melting, including moisture in ordinary air, from hydrated corrosion products or oily residues on the surface of the metal prior to melting, from moisture in crucibles, ladle linings or from the co-presence of the component elements of compound gases in the metals and fluxes, included in the charge. It is common practice to melt many metals in oxidizing atmospheres in order to prevent solution of reducing elements, but this is only effective when the metal melted will dissolve oxygen and is so kept free from the unwanted elements.

(4) It has been established in three cases at least, and possibly in others, that hydrogen may enter the metal during solidification in the mold, and thus gas porosity may be found in castings made from substantially gas-free melts. In one particular case examined (sand-cast phosphor bronze) the metal absorbed hydrogen by reaction with moisture in the sand, and it was necessary to preheat the sand to a sufficiently high temperature to drive off water combined with bonding clay to prevent the effect.

(5) The properties of well fed castings are impaired by the presence of gas in the melt and the resultant gas porosity, but in badly fed castings shrinkage porosity may be locally concentrated at changes of section, and the presence of gas may serve to disperse this porosity with substantial improvement in the properties of the casting at that point. Gas

is likely to be most effective in this respect when the rate of solidification is high.

Excess amounts of gas dissolved in the melt may be removed by one or more of three methods: (a) pre-solidification, (b) by scavenging, that is, treatment of the melt with an inert gas such as dry nitrogen, with or without a flux to facilitate the escape of gas from the melt and (c) by oxidation-reduction treatment. The first method is tedious and expensive and is not recommended. The second is generally applicable for the removal of hydrogen, while the third is applicable to the removal of hydrogen, carbon or sulphur from alloys which exhibit reaction-gas unsoundness. In general, the third method is not likely to be applicable to alloys containing appreciable amounts of aluminum, magnesium, zinc, phosphorus, manganese or silicon, since the elements generally lower the solubility of oxygen in the melt to such low values that reaction-gas unsoundness involving oxygen cannot occur, no can the reducing element be displaced by oxidation treatment.

Moderate amounts of dissolved gas may serve a useful purpose in some cases, by distributing local concentrations of shrinkage porosity, and although controlled gas contents are difficult to obtain, they can be secured by treatment of the melt with controlled mixtures of the soluble gas and an inert gas, or by control of the melting practice. Alternatively, the melt may be degassed, and then gassed to the required degree by addition of suitable amounts of hydrated salts which evolve water vapor and hence introduce hydrogen into the melt.

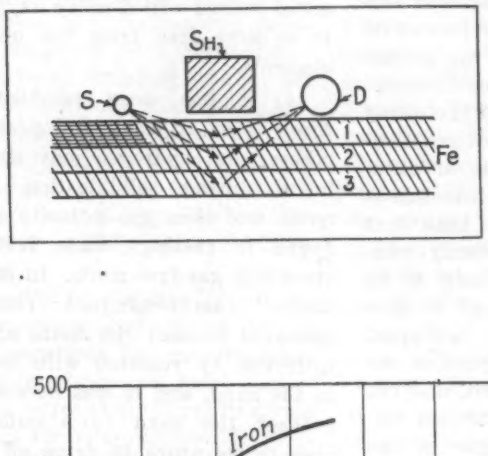
Measuring Wall Thickness by Gamma Rays

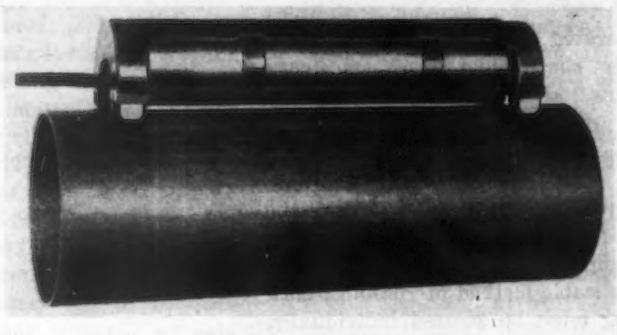
THE determination of the thickness of walls of piping or vessels, which has meant the drilling of a hole into the structure and the use of mechanical calipers, can now be done with a consistently high degree of accuracy by measuring the amount of back-scattered gamma rays.

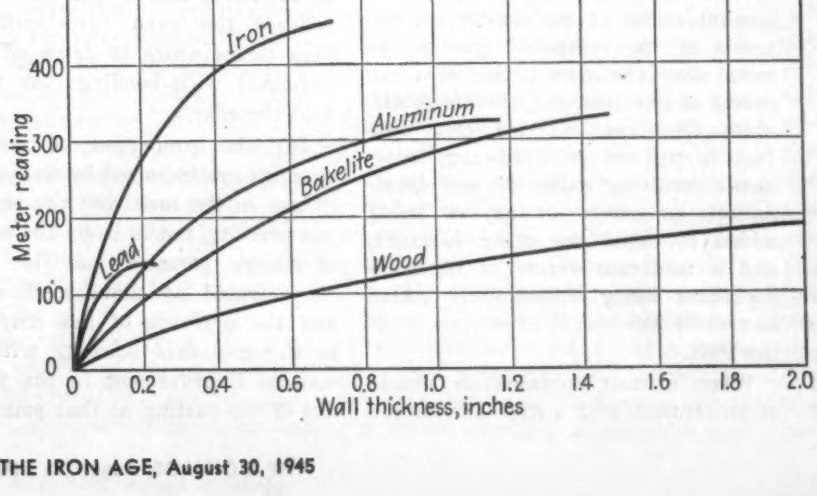
A tiny amount of radium salt enclosed in a needle is the source of gamma rays that is utilized in the Penetron, which is a development of the Texaco Development Corp., New York. This company in 1937 developed Radioactivity Well Logging which discovers and records through steel wall casing by-passed oil producing areas; a method which, somewhat similar to the Penetron method, has been responsible for the discovery of hundreds of producing wells.

Readings can be made with the Penetron in 25 sec and not require shut down of the equipment. By measuring the intensity of back-scattered radiations which increases as a direct function of the thickness of the material, the device can be used on various materials, including steel, aluminum, plastic, brass, wood. By the same method liquid density can be determined (more back-radiations being encountered in liquids of greater density). The location of liquid level in vessels can be determined with equal facility as well as the interface of two liquids of different densities. A diagrammatic illustration of the principal involved in the operation of the Penetron is shown in fig. 1.

The Penetron consists of two main parts: namely, the head and the control box. The head contains the radiation source, the detector, a shield between the two, and a pre-amplifier which sends the minute electric impulses to the control box containing the measuring circuit and power supply. Meter readings can be converted into wall thickness in inches by referring to a standard calibration curve (fig. 2). In fig. 3, the head is shown in position in a magnetic-type holder. The weight of the equipment amounts to 40 lb.







UPPER LEFT

FIG. 1—S is the source of the rays, D is the detector and Sh is the shield guarding the detector from direct rays.

o o o

LEFT

FIG. 2—Typical calibration curve for various materials.

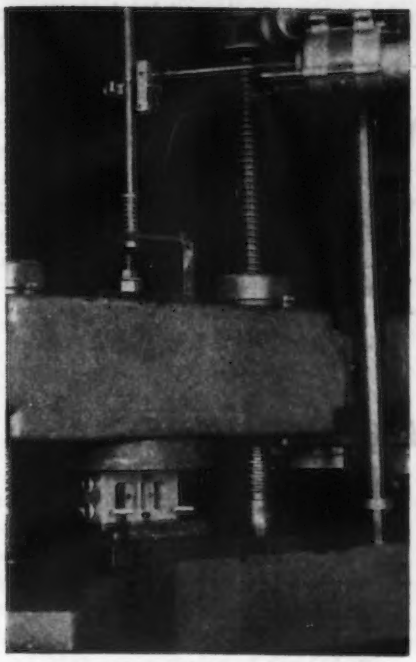
o o o

ABOVE

FIG. 3—Head containing radiation source, detector, shield and pre-amplifier unit is shown in position in a magnet type holder.

Aging and Stretching 24ST Aluminum

By LOUIS ECKER
Research Engineer, North American Aviation, Inc., Inglewood, Calif.



TENSILE machine showing compression fixture in place and method of recording deformation.

EXPERIMENTAL studies have been been carried on to determine what changes in mechanical properties can be obtained when aluminum alloy 24ST as-received sheet and extrusion are subjected to aging only, giving 24ST81, and to a treatment involving 2 pct stretching plus aging, resulting in 24ST84.

Three tests were conducted. In test No. 1, 50 samples 40 in. in length were cut from 24ST as-received extrusions 22 ft long. From each sample tensile and compressive specimens were cut and these were tested in the 24ST, 24ST81 and 24ST84 condition after suitable stretching and aging. The 24ST material was stretched 2½ pct to obtain sufficient cold work for the 24ST84 temper. Compression specimens consisted of a 2-in. length of the full cross-section of the extrusion. Flanges of the extrusion were clamped between thick aluminum blocks to prevent buckling during test. All specimens were aged in an oil bath for 8 hr at 375°F.

For test No. 2, 50 samples 40 in. long of 24ST as-received extrusions were cut from 8-ft stockroom lengths. The procedure of testing this group of 50 extrusions was the same as in test No. 1 with the exception that compression results were obtained by use of a different type of specimen. The compression specimens were machined from one flange of the extrusion to dimensions ⅝ in. wide by 2 5/16 in. long. This specimen was then rigidly clamped in a fixture to prevent buckling while compression loads were applied.

Test No. 3 was made on 55 samples of 24ST as-received Alclad sheet representing 55 different 48x144-in. sheets and included thicknesses of 0.040 in., 0.051 in., 0.064 in., 0.081 in. and 0.091 in. Tensile and compression specimens were cut from sample sheets and tested in the 24ST, 24ST81 and 24ST84 condition after suitable stretching and aging. Material in the T84 temper was obtained by stretching the 24ST sheet 2 pct and then subjecting it to the proper aging treatment. Material in T81 temper was obtained by merely aging the T material. All specimens were aged in an air oven for 8 hr at 375°F. Compression specimens were the same type as those used in the second test.

Additional data on aging of aluminum alloys appeared in THE IRON AGE, *issues of Jan. 27, 1944 and June 28, 1945.*

In as-received extrusions, tensile yield strength is about 80 to 81 pct of tensile ultimate strength. Aging to T81 condition increases this to 96 pct. Stretching and aging to the T84 condition has no further effect in increasing this ratio.

The compressive yield strength is 77 to 80 pct of tensile yield in the as-received condition. Aging to T81 condition increases this percentage to 93 to 94 pct. Stretching and aging to T84 causes no further increase in this ratio.

Aging 24ST to the T81 condition increases the ultimate strength about 12 pct. Stretching and aging the same material to T84 causes an increase of 15 to 16 pct or an improvement of only about 3 pct. By aging 24ST to the T81 condition the tensile yield strength is increased about 33 to 34 pct, while stretching and aging the same material to the T84 condition causes an additional increase of about 4 to 5 pct.

The greatest increase due to aging is in the compressive yield strength. Aging of the as-received extrusion to T81 results in an increase of 59 to 60 pct in compressive yield strength. When extrusions in T condition are stretched and aged to T84 temper, not much improvement over the T81 temper is shown in those specimens tested in full section. Flat specimens tested in compression fixture in T84 temper show an increase of 69 pct over the T temper.

The tensile yield tensile ultimate ratio for Alclad sheet in T temper is about 0.75. This ratio is about 0.91 for both the T81 and T84 tempers.

The compressive yield tensile yield ratio for the T temper is about 0.83. For the T81 and T84 conditions, this ratio is 0.97 to 0.99, that is, in these tempers the compressive yield strength is about equal to the tensile yield strength.

Aging the as-received sheet has practically no effect on increasing the ultimate strength. However, processing the material to the T84 temper does bring about some slight improvement in ultimate strength, about 6 pct.

Aging the T material to the T81 temper increases the yield strength about 18 to 19 pct. When the T material is stretched and aged to T84 the yield strength is improved about 29 pct, or an increase due to stretching of about 10 pct.

In the sheet, as in the extrusions,

the greatest improvement caused by aging is in the compressive yield strength. This increase was 47 pct for gages under 0.064 in. and 39 pct for gages over 0.064 in. in the T81 temper. In the T84 temper the compressive yield strength was further increased another 10 pct.

The elevated temperature aging treatment of 24ST extrusions and Alclad sheet with or without additional stretching does act to improve the tensile yield strength, as high as 33 pct for extrusions and 18 pct for sheet. This treatment has the greatest beneficial effect on compression yield strength, extrusions showing improvements as high as 60 pct and sheet 47 pct. Little effect was noted in ultimate strength.

Extrusions showed much greater improvements in mechanical properties due to elevated temperature aging than did sheet stock. The greatest improvement in properties, however, was brought about by merely aging the T material to the T81 condition. It is questionable whether in all cases the small additional improvement in the T84 condition over the T81 would warrant the extra stretching operation.

Broaching Hardened Involute Splines

By CARL HIMMELRIGHT
Project Engineer, Warner & Swasey Co.

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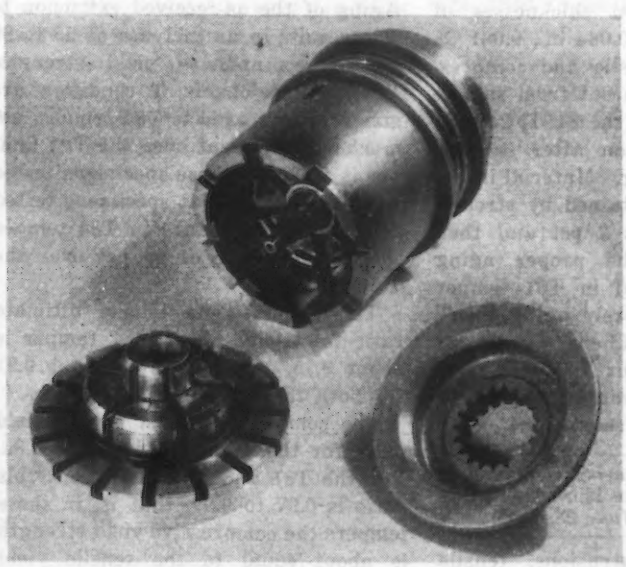
BROACHING of involute splines in a hardened, bell-shaped hub which forms part of the supercharger drive of the Rolls-Royce engine calls for two unusual operations at the Warner & Swasey plant, where these parts are being made under subcontract to the Packard Motor Car Co. One is the hardening of the part and the other is the sizing of the splines in the hardened state.

After the forging is machined in turret lathes, the bore is broached to form the involute splines in the hub in the soft state. It is then ready to be hardened. Because of the bell-shape and the thin sections involved, hardening is done in a special spreader-type quenching die (fig. 1) on a standard Gleason quenching press. When the part is taken from the hardening furnace, it is dropped over the flat, split lower die. The quenching press is then closed and the upper long cylindrical die comes down and engages with the work and the lower spreader dies. By grinding the bushing *A* in the center of the upper die to various lengths, the amount of spreading and stretching necessary to maintain size in the work can be controlled.

The spreader bushing initially is made solid and as a last operation is slit into six equal sections with a 1/16-in. abrasive saw. The tapered plunger which engages the bushing has a 25° included angle. Bottom ring has 16 slots, ¼ x ¼ in., equally spaced and is ¾ in. high and 5.113 in. in diameter, whereas the upper cylindrical body has eight ⅛ x ¼-in. slots and is 4½ in. in diam.



LEFT

FIG. 1 — Spreader type quenching die used to control distortion in heat treating a bell shaped part having an involute spline in the bore.

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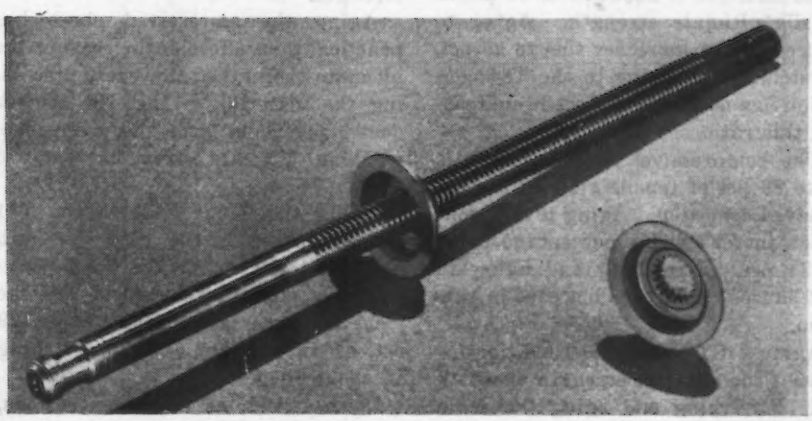
BELOW

FIG. 2—The same size broach is used in sizing the hardened involute spline as is used for cutting the splines in the green state.



After the hardening operation it is necessary to resize the involute splines to achieve the required final accuracy. Satisfactory results are obtained by rebroaching these parts with the same size of broach as is used on the part before hardening. (See fig. 2.) Through experimentation the size to be maintained by expansion in the quenching die is established so that when the spline broach is pulled through the hardened piece, it is further stretched, sized and burnished to the extent that at least a 90 pct "blue-in" bearing is obtained on the spline relationship gages. This result would indicate that even though the broach is being pulled through a hardened piece, it actually sizes the hardened part without, incidentally, producing undue wear on the broach. The involute spline comes out round and straight, with tooth-to-tooth spacing correct and the involute form also "on the button." The amount of undersize to allow the part to be successfully broached in the hardened state must be determined by experimentation; if the parts are allowed to come too much undersize, the broach will not bring them up to the correct size since it does no actual cutting.

Presses Facilitate Sleeve Assembly In Blocks

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FIG. 1—After each pair of cold treated cylinder liners has been pressed into place, the block is indexed to the next position; another pair of sleeves is pressed in.

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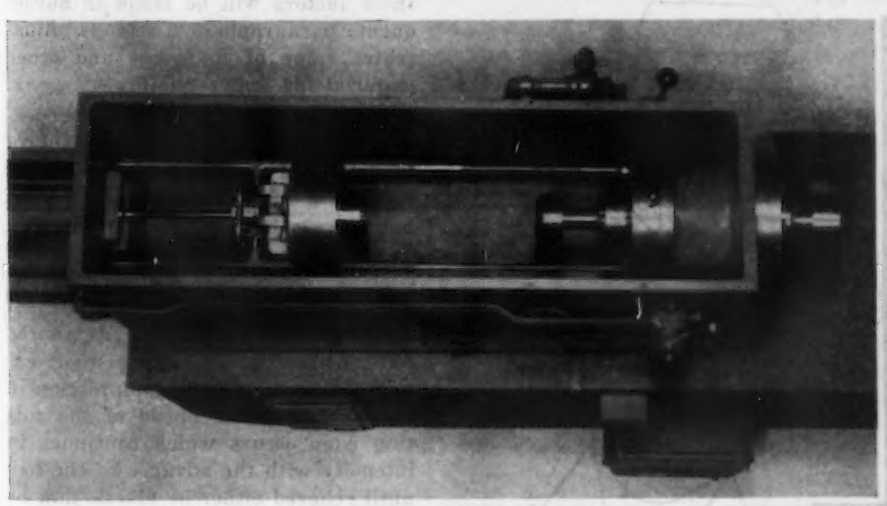
AN ingenious assembly setup combining sub-zero cold treatment, heating, and hydraulic presses for the assembling of steel sleeves into cylinder blocks has been developed by a well-known engine manufacturer. The job consists of pressing eight sleeves into the bores of a V-type cylinder block. The sleeves are cold treated in a refrigerating unit while the blocks are being heated up somewhat, for additional clearance. The sleeves are then pressed into the bores two at a time on a special dual press designed for this purpose by Colonial Broach Co., Detroit. After the first pair of cylinders has been pressed into place, the cylinder block is indexed to position for the next pair of sleeves, and so on until the job is completed (see fig. 1).

Indexing is actuated by means of hand operated, spring loaded plungers which contact index grooves on the side of the fixture slide.

The presses, although specifically designed for the job, are similar to standard Colonial assembly presses as regards basic operating principles. In the hydraulic pressure system ram speed as well as maximum pressure exerted are adjustable within the capacity of the presses, affording precision control. Motors and hydraulic cylinders are built into the presses, reducing floor space requirements.

In view of the fact that liners assembled by use of a combination of heat and cold exhibit a tendency to "crawl" up and out of the bores when block and liners return to normal room temperatures, it is necessary to set the sleeves after a cooling period. For this, the block goes to the special press shown in fig. 2, which operates on a combination of hydraulic pressure and impact. Note that the platen of this press is inclined at an angle to aline each row of bores with the plunger of the press. Positioning of the cylinder block for each individual sleeve is by means of locating stops in the raised strip on the platen.

After the assembly has been positioned in this press, hydraulic pressure is applied to the sleeve by a piston in the ram. Simultaneously, air pressure lifts a weight above the hydraulic piston (see fig. 3). Arrived at the top, the weight is tripped by a dog and drops on the plunger of the hydraulic piston, producing an additional impact load to drive the sleeve and set it in the cylinder bore. One sleeve is set at a time on this press. After the sleeves on one side of the block have been set, the block is turned around to set the sleeves on the other side in a similar manner.



ABOVE

FIG. 3—Cover removed to show close-up of impact mechanism and hydraulic piston.

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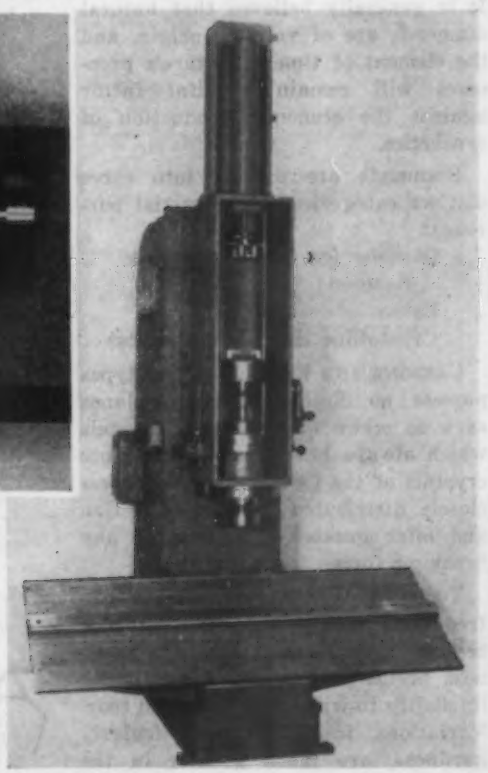
FIG. 2—Since the pressed-in sleeves have a tendency to "crawl" out of the bore as the assembly resumes normal room temperature, the sleeves are given a final set on this special Colonial press which exerts both hydraulic pressure and impact.



Selection and Use Of DIAMOND TOOLS

By EDWARD L. MURRAY
Warner & Swasey Co., Cleveland

. . . Diamond tools are being used now more than ever before. For what applications these tools are best fitted, the types of tools, and the technique for using them are all discussed herein, in the first section of a two-part article. The data herein have been compiled by the author for the ASME Special Research Committee on Metal Cutting and will form a part of the ASME Manual on Metal Cutting.

SPECIAL characteristics of the diamond have encouraged its use in industrial processes for several hundred years. During recent peace-time years about one half by weight of all diamond production was used for precious stones with the remainder utilized for various technical applications. War-time usage has increased the industrial percentage to about 80 pct; about 60 pct of the industrial use is in the form of powder for polishing, shaping, etc., and it is estimated that technical applications of the remaining 40 pct of industrial diamonds (i.e., whole stone) break down in the following proportions:

	Pct by Weight
For truing abrasive wheels	40
For core drilling	20
For wire drawing	20
For other industrial processes, including metal turning and boring	20

Synthetic diamonds have been produced successfuly but high cost leaves little indication that their use will be extensive in the near future for precious stones and industrial purposes. It is generally believed that natural diamonds are of volcanic origin, and the element of time in nature's processes will remain a vital factor against the economic production of synthetics.

Diamonds are divided into three distinct categories for industrial purposes:

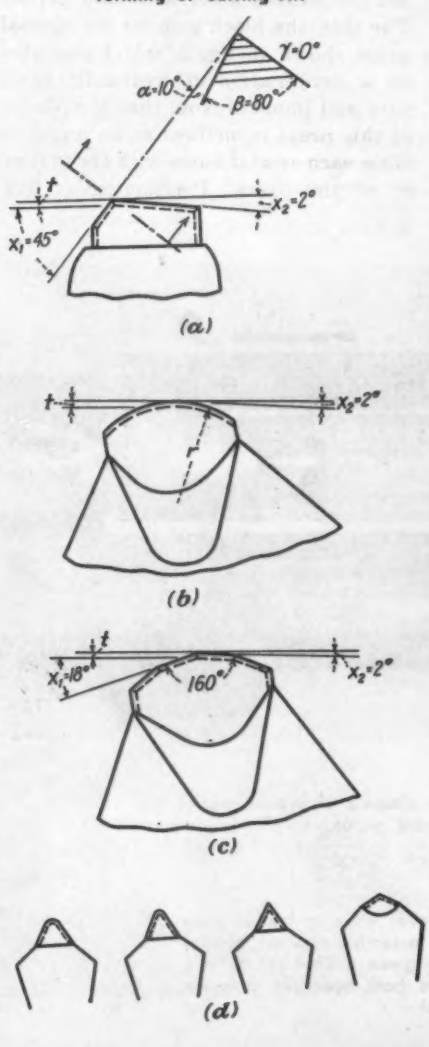
Carbons (carbonado or black diamond)
Ballas
Crystalline diamonds (boarts)

CARBONS AND BALLAS: These types possess no distinct cleavage planes such as occur with diamond crystals which always have four. The minute crystals of the former are themselves closely distributed in every direction and offer greater resistance to any breaking force.

Tools of the highest quality are frequently equipped with carbons; however, great heat reduces the hardness of the carbon and consequently its ability to withstand wear and tear. Variations in quality, particularly hardness, are much greater in the case of carbons than in any other kind of diamonds.

Ballas diamonds constitute a type intermediate between carbons and diamond crystals. Like carbons they are found chiefly in Brazil. They are so enduring and resistant to wear that they are valued highly for industrial purposes.

FIG. 1—Various types of cutting edges which may be used with diamond tools. Types (a), (b), (c) are for turning and boring. Type (d) represents shaped diamonds as might be used for forming or cutting-off.



CRYSTALS: Diamond-crystals or boarts are crystalline diamonds with distinct cleavage planes. In commercial and industrial circles the term "boarts" covers also any diamonds which cannot be utilized for ornamental purposes. Remainders, or very small diamonds, are sold under the name "diamond boart" and are used for the production of diamond powder.

Table I gives a survey of the uses of various kinds of diamonds. As is generally known, highest hardness is one of the outstanding special characteristics of the diamond. Other special characteristics are chemical inertness, high Young's modulus, and low compressibility. Reference to these factors will be made in subsequent paragraphs. Table II illustrates value of diamonds and other material for compressibility.

Why the peculiar physical properties of the diamond promote its ability to cut metal under certain conditions involves a further discussion of what happens in the general process of metal cutting.* Although the exact process of metal cutting is imperfectly known at the present time, the common feeling is shared today that as a cutting tool engages a work piece a compression in the work material ahead of the cutting edge occurs which continues in intensity with the advance of the tool until relieved either by plastic flow or a rupture in a direction roughly perpendicular to the tool face. When rupture occurs as with brittle materials, like brass, a short chip or segmental-type chip results. When plastic flow occurs, as with ductile materials like aluminum, a continuous chip results. For ductile materials, the high friction between the compressed layer and the tool face, aided by the high tem-

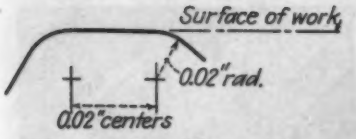


FIG. 2—Tool form illustrated has produced surface finish down to one microinch on aluminum pistons.

perature and high specific pressure results in the layer usually remaining anchored to the tool face to form a built-up edge (see figs. 1 to 12) while the chip body shears away from it and passes off the face of the tool.

With ductile materials, work finish, therefore, appears to be partially a function of the elimination of the built-up edge which tends to escape with the work piece and create a rough finish on the machined surface. Conditions which help eliminate the built-up edge for ductile materials are:

(1) Small chip thickness
(2) High cutting speed
(3) Keen cutting edge
(4) Maximum temperature at cutting edge
(5) Minimum opposition to chip flow over tool face, by:
a—high polish on tool face
b—use of tool material having low coefficient of friction

Since a high cutting speed is desirable to produce finish under conditions outlined above and since the main stress and wear on a tool face approaches the direct cutting edge under high speed and small chip conditions, it becomes clear that a tool can quickly become blunted at its most sensitive point unless it possesses great wear resistance.

It is obvious, then, that the diamond possesses those characteristics—wear resistance, hardness and low compressibility—which contribute to the production of high finish and size control over the greatest length of cutter travel. By the same token, it becomes clear that the diamond is a finishing tool and is not adapted for the removal of large chip volume.

Tables III and IV summarize materials which can be cut satisfactorily

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RIGHT

FIG. 4—Positions of the diamond point relative to the work for turning operations: (a) Incorrect; cutting edge below center, tool is pressed into work. (b) Not recommended; cutting edge is at center height but rake angle is unnecessarily large. (c) Recommended; cutting edge at center height, rake angle zero. (d) Recommended for large diameters; cutting edge somewhat above center height (about 1/100 work diam.), clearance angle small, rake angle large.

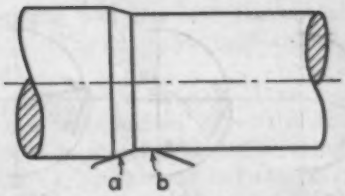

FIG. 3—Relation of side and end-cutting edges to work piece. Proper adjustment of endcutting edge (b) is important to obtain good finish.

with diamonds in the light of present knowledge. A noticeable lack of information exists concerning the use of the diamond on ferrous materials, particularly hardened steel. Early literature discloses many uses of the diamond on hard steel but no specific data are currently available on this subject. The consideration which is now accorded the proper orientation of crystal planes as related to cutting facets may develop methods of using the diamond on a greater variety of materials.

Although the diamond is employed for a variety of machining operations,

TABLE I

Industrial Applications of Various Kinds of Diamonds

Producing Center	Brazil		South Africa, South West Africa, Congo, Australia, Borneo			
Kinds of diamonds	Carbons[1] (Black Amorphous Diamonds)		Boarts (Crystalline Diamonds) and Ballas (Roundish)			
Working condition	Rough (Natural Edges)	Polished and Cut	Rough (Natural Edges)	Polished and Cut[2]	Polished and Drilled	Powder[3] Form
Workpiece				Wear resisting plates Scratching points Precision bearings	Precision bearings	
Tools in which used and/or their applications	Deep rock drills Stone drills Stone saws Turning tools for porcelain, artificial stone, hardened steel, precious stones and diamonds	For turning of calender rolls (paper), machining of hard rubber (Ebonite), fiber, celluloid drilling of stones, precious stones, glass	Deep rock drills Stone drills Stone saws Glaziers' tools Engravers' tools Turning tools for hardened steel, porcelain, natural and artificial stone, precious stones and diamonds	Precision turning of soft and light metals and synthetic resin plastics	Drawing dies Injection dies	Sawing, drilling, engraving, polishing, grinding, lapping of glass, stone, precious stone, coal
Testing points for	Minerals		Minerals	Tracer points for surface testing, points for hardness testing by scratching and indentation		
Readjustment tools	Truing tools for grinding wheels		Truing tools for grinding wheels	Truing tools for thread and form-grinding wheels		Grinding and polishing of sintered-carbide tools and dies, grinding and polishing of precious stones and diamonds

[1] Ballas found in Brazil and South Africa has applications similar to carbons with natural edges. [2] Cut means machined by grinding and polishing. [3] Used in the following conditions: (1) mixed with oil and used on laps; (2) rolled or pressed in metal; (3) mixed with metal or with resinous p owder and sintered or fused.

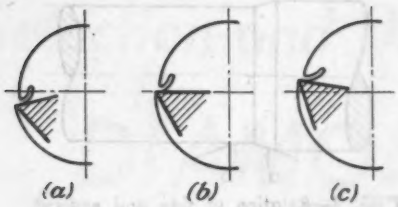

FIG. 5—Positions of the diamond point relative to the work for boring operations: (a) Incorrect; cutting-edge below center, tool edge is pressed into work. (b) Recommended, cutting edge at center height, rake angle zero. (c) Recommended for larger holes; cutting edge above center height, clearance angle small, rake angle large.

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the chief present-day applications are probably boring and turning. Part of this is undoubtedly due to the existence of acceptable machine tools for the work.

TOOL FORMS: Diamond cutting edges for boring and turning may be classified as follows:

(1) With only one cutting edge (fig. 1-a)

(2) With a circular cutting edge (fig. 1-b)

(3) With several cutting edges (facets) side-by-side around the contour of the tool nose (fig. 1-c)

(4) Special forms for cutting-off and profile work (fig. 1-d)

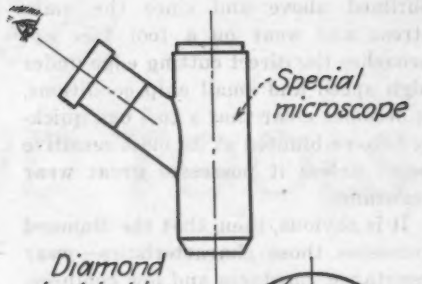

FIG. 6—Optical means for precise adjustment of diamond cutting edges to work piece.

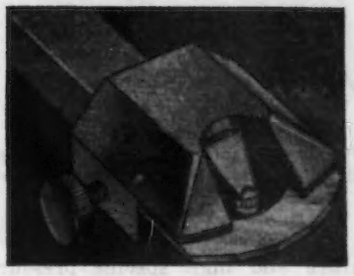

FIG. 7—Winter visor device for adjusting the diamond cutting edges to the work piece by mechanical means. A multiple-size template of the actual tool form is adjusted parallel to the diamond facets then positioned to the work piece, thus protecting the sensitive diamond edge from actual contact with the stationary work piece. The visor protects the cutting edge when not in use.

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TABLE II

Compressibility[1] of Some Solid Materials

Group	Materials	10^{-6} cm² Per Kg
Metals	Magnesium	3.0
	Tin	1.8 to 2.1
	Aluminum	1.4
	Silver	0.79 to 1.0
	Copper	0.73 to 0.80
	Iron	0.606
	Gold	0.56 to 0.63
	Nickel	0.42
	Platinum	0.37 to 0.4
	Tungsten	0.26
Minerals	Graphite	3.00
	Quartz	2.75
	Topaz	0.61
	Corundum	0.40
	Silicon	0.31
	Boron	0.3
	Diamond	0.14 to 0.18

[1] The compressibility is interconnected with other elastic properties.

TABLE III

Metallic Materials Which Can Be Cut with Polished Diamonds

(turning, boring, milling)

Light metals: aluminum, magnesium alloys, Duralumin, Alusil, etc.
Soft metals: copper, brass, zinc alloys
Bearing metals: babbitt metal, bronze
Precious metals: silver, gold, platinum
Cast iron and steel (in special cases)

TABLE IV

Nonmetallic Materials Which Can Be Cut Preferably with Polished Diamonds

Soft rubber (i. e., platens for typewriters and rolls for printing machines)
Hard rubber (Ebonite; i. e., in fountain pens)
Plastic materials (phenol-formaldehyde, urea-resins, cellulose-acetate, etc.)
Compressed graphite (i. e., electrodes)
Composite materials (i. e., paper calendar rolls).

TABLE V

Cutting Angles of Polished Diamond Tools

Clearance angle, α	For turning For boring	5° to 8° 8° to 15° [2]
Rake angle, γ	For soft materials such as light-metal alloys, bearing metals, etc. Copper, brass and hard bronzes	0° to 3° 8° or negative up to 8° [1]

[1] In special cases, up to 20° negative rake is used.
[2] Depending on the diameter to be bored and the thickness of the diamond tip.

TABLE VI

Operating Conditions for Diamond Tools

		Metals	Nonmetallic Materials[1]
Cutting speed	fpm	200 to 10,000	100 to 3300
	m per min	60 to 3000	30 to 1000
Feed	in. per rev	0.0008 to 0.004	0.0008 to 0.020
	mm per rev	0.02 to 0.1	0.02 to 0.5
Cutting depth	in.	0.008 to 0.0240[1]	0.0008 to 0.0240[1]
	mm	0.02 to 0.6[1]	0.02 to 0.6[1]

[1] In special cases, when using a ball support, up to 0.06 in. (1.5 mm).

TABLE VII

Operating Conditions for Diamond Tools

Material	Cutting Speed	
	Fpm	M Per Min
Heat-treated aluminum alloys	650 to 1000	200 to 300
Pure aluminum	800 to 1150	250 to 350
Magnesium alloys[1]	1000 to 1250	300 to 380
Cast bronzes	500 to 1000	150 to 300
Lead bronzes	1650 to 2000	500 to 600
Babbitt metals	800 to 1150	250 to 350

[1] As fine magnesium alloy chips are easily ignited, special precautions should be observed.

Diamonds with a circular polished cutting edge (fig. 1-b) can be adjusted at any angle to the axis of the work. Any point of the cutting edge can be utilized until it becomes blunted. This form is suitable for machining hard rubber, plastic material, calender rolls and in many cases, metal. Relatively high back-pressure is its disadvantage.

In recent years the form shown in fig. 1-c has found increased favor, particularly in England. The life of the tool is increased because of the numerous cutting edges and at the same time, adjustment to the work is facilitated. The individual cutting edges are relatively small, each being about 0.020 in. to 0.060 in. long; hence, an average sized diamond might have three to seven cutting edges. As each cutting edge becomes blunted, a new facet is brought into cutting position by altering the position of the diamond holder. Excellent results in surface finish (down to 1 m in.) on aluminum pistons have been obtained with the tool form shown in fig. 2.

TOOL ANGLES: The best position of the end cutting edge is at an angle of about 1° to 2° with the axis of the work; then, for single-facet diamonds with a point angle of 130° to 135°, a side-cutting edge angle of about 45° results (see fig. 1). The angle of the end-cutting facet of 1° to 2° is very important as it determines how the cutting edge removes part of the feed marks, thereby producing a smoother surface, fig. 3.

The lip angle should be between 70° and 90° for maximum strength. The rake angle on standard diamond tools is usually zero to permit easy adjustment. Small rake angles with a consequent reduction in end-relief angle can be obtained by adjusting the tool somewhat above center height. The maximum negative rake-angle which should be considered is about 20°, such

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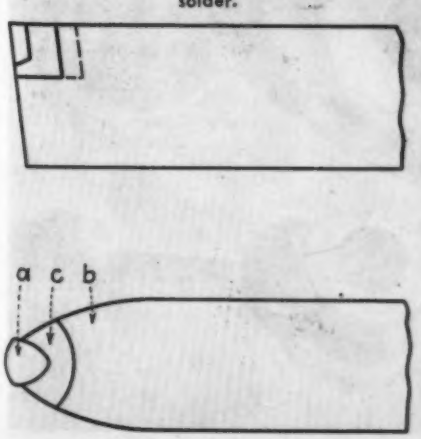
FIG. 8—Diamond mounted in a steel shank: (a) diamond, (b) shank, (c) solder.



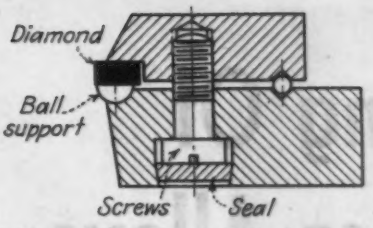


FIG. 9—Diamond mounting with a hemispherical seat.

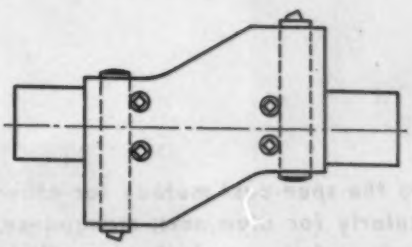


FIG. 10—One form of symetrical, rotating type, tool body.

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as might be used on lead or bronze. In this case, a shaving action with high cutting pressure results.

Table V contains recommended values for the cutting angles of polished diamond tools.

ADJUSTMENT: Figs. 4 and 5 show the various possibilities for the height adjustment of the diamond cutting edges. If possible, the cutting edge should be adjusted to center height, but an adjustment above center height (about 1/100 diam) is favorable, whereas the reverse position (below center height) is harmful to the diamond. Captions for the illustrations give further information on the influence of height adjustment.

Owing to the small facets the exact adjustment of the diamond cutting edges to the work involves certain difficulties. Mechanical or optical means should be used for this operation. When the work is stationary, the diamond point is very sensitive to pressure or shock, hence the adjustment should be performed without bringing the diamond into contact with the work (see figs. 6 and 7).

For boring, round bars of maximum size are preferred and some means of micrometer adjustment should be provided to position the cutting edge.

Rotating tools set with diamond tips must be properly balanced. Two bodies should be symmetrical in form (see fig. 10.) Simultaneous use of a sintered - carbide tool and a diamond tool is not recommended; only after the carbide tool has left the cut should the diamond come into action (fig. 11).

SETTING OF STONE: Many methods have been devised to set the diamond stone in a tool holder. Soldering (see fig. 8) has proved harmful in many cases to the highly polished cutting edges, with the result that cold-setting methods are now in current favor. One method of cold setting for a turning tool is shown in fig. 9. A further advantage of this design holder (used extensively in England) is that great depths of cut (up to 0.060 in.) can be taken because the main cutting pressure is distributed over a wider area.

SPEEDS AND FEEDS: Tables VI and VII summarize operating data which may be used as a basis for selecting proper feeds and speeds for various materials.

FINISH: The diamond tool gives a high-grade surface finish to many metallic and nonmetallic surfaces which is surpassed in some instances only by the finest lapping, polishing, and Superfinishing methods. (These latter methods of finishing involve a second handling of the work piece with consequent possibilities of introducing eccentricity and out-of-roundness.)

Diamond tools are particularly successful in generating work finishes related to wear, such as bearings, electric motor commutators, etc. Other types of cutting media have a tendency to smear, or smooth, the work crystals in the boundary zone, whereas, the diamond, owing to its hardness and rigidity, cuts through the granular structure thus preserving the porosity of the metal (for example, self-lubricating bearings) and eliminating high points on the finished surface which normally cause initial or primary wear.

Ed. Note: Next week the author concludes this article with data on machine tool design, grinding wheel truing, and selection and use of abrasives.

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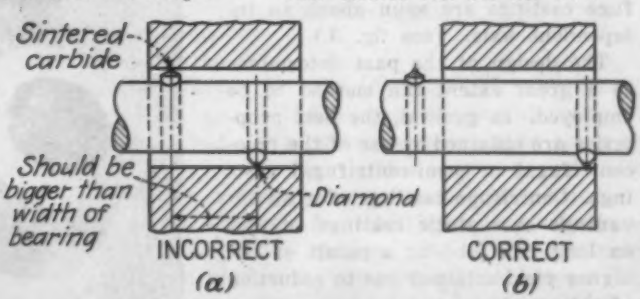
FIG. 11—Combined used of diamond and carbide tool: (a) Incorrect; carbide and diamond cutting simultaneously. (b) Correct; diamond starts cutting after carbide tool has left hole.



Spinning Of Copper-Base Alloys

. . . Attention is directed herein to the spun-cast method for other than straight-wall castings, particularly for aluminum, manganese, tin, lead, and nickel bronzes. A number of the products shown here have been achieved only within recent months.

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and
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A GREAT deal of worth-while literature is available today covering production, machines, speeds, and other technical data relative to the spinning of castings.* The purpose of this article is to describe recent development in the alloys, sizes, shapes and contours of copper-base spun castings.

* *See* THE IRON AGE, *issues of April 1, April 22, May 13, May 20, and Dec. 2, 1943; Jan. 6, Jan. 13, March 30, May 4, Oct. 5, and Nov. 16, 1944.*

Spun castings may be divided into three basic classifications:

(1) True centrifugals
(2) Semi-centrifugals
(3) Centrifuge

True centrifugal castings are spun about their own axis with an ID formed by the centrifugal force alone. (see fig. 1.) Semi-centrifugals are also cast about their own axis with some attempt made to control the internal contour. (see fig. 2.) Centrifuge castings are spun about an independent axis. (see fig. 3.)

The design of the part determines to a great extent the method to be employed. In general, the best properties are obtained by use of the true-centrifugal or semi-centrifugal castings. Centrifuge castings offer an advantage over static castings in cost on long run jobs as a result of the higher yield attained due to reduction of gates and risers.

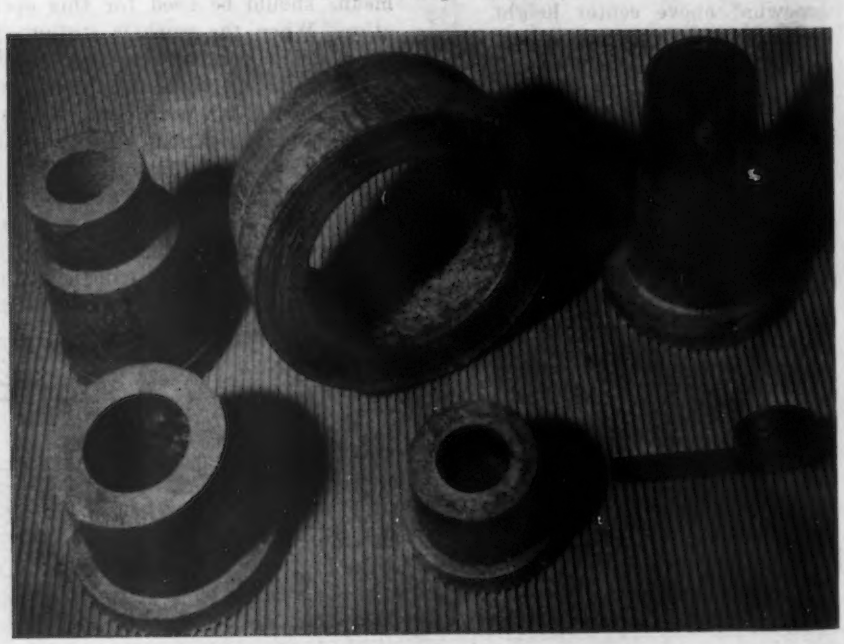
In general, it can be said that an increase of approximately 10 pct in tensile strength can be achieved in true-centrifugal castings. This increase in tensile strength can be principally attributed to the controlled directional solidification inherent in the centrifugal process. The zone of weakness found in static castings at the point of final solidification is eliminated in centrifugals since the freezing progresses at an even rate from the outside toward the inner wall.

Certain basic characteristics should be borne in mind when considering the use of copper-base alloys in spun castings.

Aluminum bronze because of its relatively narrow solidification range must of necessity be handled rapidly from the furnace to the mold and must be introduced into the mold quickly but in a steady, even stream. It is difficult to maintain a smooth inside contour because of the rapid oxidation of the metal and the high shrinkage. It is important that the mold be maintained at proper temperature to reduce too rapid chilling which results in porosity and cold laps. Very careful control must be exercised throughout the casting cycle if best results are to be attained.

Manganese bronze is easily cast by the spinning method. It has good fluidity and a low melting point

FIG. 1—These true centrifugal castings are spun about their own axis with an ID formed by centrifugal force alone.



(1650° F to 1700° F). It is not widely used as a bearing material, however, and the shape of parts designed for manganese bronze does not usually lend itself to centrifugal casting. When high strength structural parts in these alloys are round and somewhat symmetrical, sound castings with smooth surfaces can be achieved. The grain structure will in general be better than static castings or even forgings. When production and cost considerations warrant, irregular shaped manganese bronze

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FIG. 3—These centrifuge castings are spun about an independent axis.

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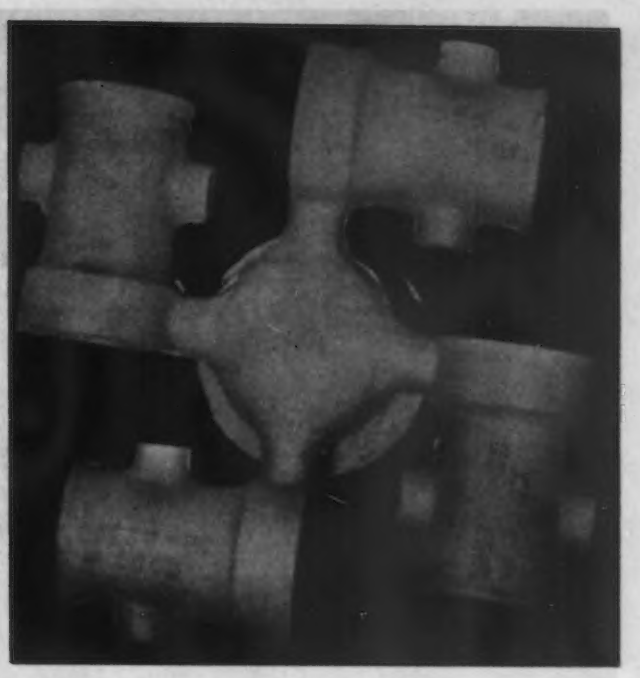

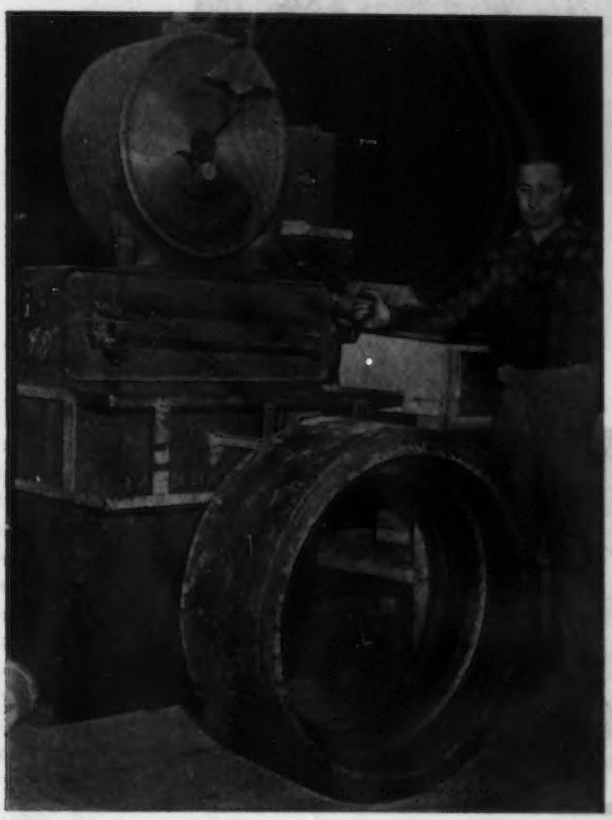

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FIG. 2—These are semi-centrifugals, which are cast about their own axis with some attempt made to control the internal contour.

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castings can be produced by centrifuging.

The tin bronze alloys have a relatively long solidification range. It is therefore necessary to chill the castings as rapidly as possible, particularly when the tin content is over 8 pct and when sections are greater than ½ in. This, of course, affects the selection of mold material.

Lead bronzes require very special equipment because of the dangerous fumes that are present. Castings will not be homogeneous, especially in the high-lead bronzes, since the lead will segregate due to centrifugal force. Thinner sections that can be readily chilled are sometimes fairly successful.

Nickel bronzes, because of their low shrinkage, often are difficult to draw from the mold. More than usual draft must be allowed to assure easy removal of the casting. Mold materials must be carefully considered.

Static Casting Failed

A good example of a true centrifugal having an intricate but symmetrical outside diameter is shown in fig. 5. This casting is made in baked-sand core molds. The many attempts that were made to cast this part successfully in static molds failed because of the difficulty in feeding the varying sections. A smooth surface is required on the OD inasmuch as very little is machined on the finished part. The centrifugal process assures dense sound castings as well as a high yield of approximately 80 pct.

Small propellers and impellers can be successfully spun-cast, as shown in fig. 6 and fig. 7. The castings shown were produced in aluminum bronze. This type of casting must be made in large quantities since cost of dies and special equipment is very high. Production is usually low due to the time involved in setting up to run each casting. In order to achieve perfectly sound castings pressure tight, the high cost may be justified, especially on highly stressed parts.

Fig. 8 shows a thin-section spur gear blank produced in aluminum bronze. This part was originally designed as a forging of SAE-1045 steel with five spokes in the web. It was never made this way because of the difficulties in forging and trimming. It was also decided that if a high-strength bronze could be obtained, longer gear life and quieter operation would be achieved. This part was centrifugally cast with a yield of about 90 pct. The lightening holes in the web were cast in by the means of inserts in the mold. Test bars, taken on the rim of the casting, pulled 114,000 psi tensile strength and 73,500 psi yield strength. The hardness was 241 Bhn. The grain structure was shown to be very fine and uniform. The excellent results attained can be attributed to high spinning speeds as well as a quick chill on the thin section.

Tin Mill Rolls Cast

Fig. 9 shows the layout for an aluminum bronze worm gear blank cast to shape. This part is produced in a steel die with core inserts which provide for eight lightening holes in the web section. The sand core inserts serve two distinct purposes. First, the correct shape of the web is cast,

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FIG. 4—Layout of variable - position spindles.

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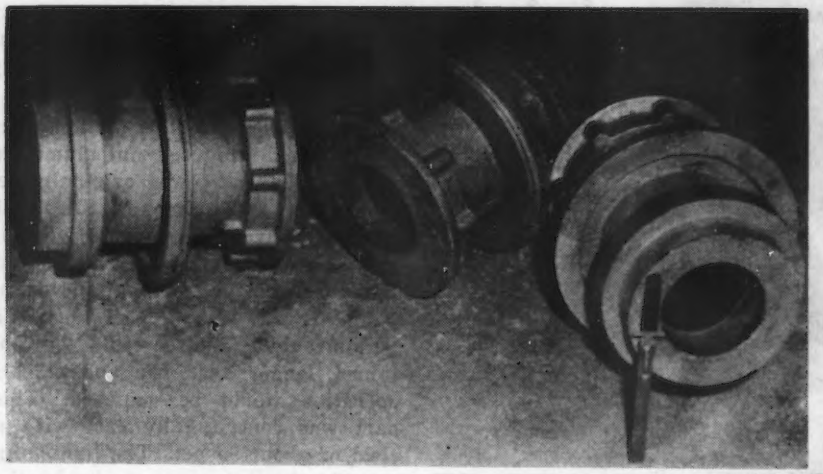

The roll itself is an aluminum bronze horizontal centrifugal casting with a 12-in. OD, a 1-in. wall and 42-in. length with a weight in excess of 500 lb. The ends of this roll are counterbored and the journals, also made of aluminum bronze, are press fitted and welded in. The original drawings specified sand castings, but it was decided to use centrifugal castings because the dense metal structure obtained on the outside assures long life and resistance to acid corrosion thereby eliminating machining. Secondly, the core acts as an insulator and allows the feeding of heavy sections through the light web section. The advantage of centrifugally cast gears compared to sand castings is that completely dense metal structure is attained at the gear rim where the maximum force and wear is applied. The casting described has a yield of approximately 85 pct whereas if sand cast, a yield of 50 pct would be good.

Fig. 10 shows an acid resistant roll used in a tin mill of one of the large steel companies. The roll is the last of a series of rolls used in the pickling operation. It is subjected to a scrubbing action from the top roll as well as abrasion from the sheet.

ABOVE

FIG. 5—True centrifugal castings having an intricate but symmetrical outside diameter.

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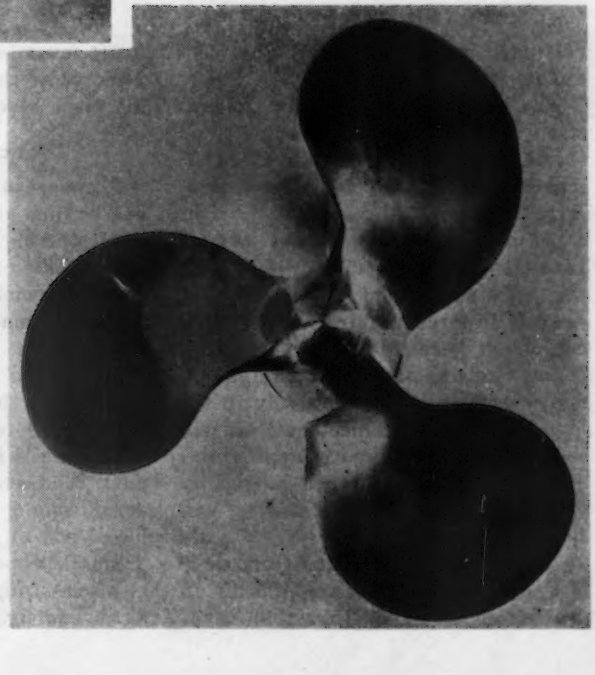
FIG. 6—Small propellers and impellers can be successfully spun-cast.



and mechanical abrasion from the steel sheet.

This roll has been in constant operation for over 6 months without showing any apparent wear. The rolls formerly used required redressing or replacing every four to six weeks causing shut down of the entire line. It is imperative that the roll maintain a highly polished surface so that the sheet will not be scratched or marred. A casting of this type and weight requires sturdy well-built equipment to withstand the terrific loads developed by centrifugal force.

There is a definite advantage in using centrifugal castings on parts subjected to pressure. Minor porosity sometimes found in sand castings which ordinarily would not be objectionable becomes an extreme hazard in pressure tight work. For instance, on an aluminum bronze pump jacket, a sand-cast head was used which caused considerable trouble in leakage under 150 lb pressure. Water leaked in areas in which no porosity was discernible to the eye, and although X ray examination disclosed porosity, it would not show the intercrystalline shrinkage which caused sweating under pressure. This condition was remedied by changing to centrifugally-cast heads. These proved so sound that X ray examination was discontinued.

In some instances, weldments are designed having some cast parts. If these parts adapt themselves to the centrifugal process, much can be saved in welding time and scrap loss as well as overall cost of the parts. For instance, flanges and heads may be cast centrifugally instead of being worked from plate. The centrifugally-cast material will weld readily without the difficulties caused by porosity and gas pockets sometimes found in sand castings.

In fabricating tubes, elbows, and tools which require flanges, heads, nozzles, separators, etc., of nonferrous material, the procedure will of economic necessity require different handling than steel fabrication. For instance, if a steel flange, 20 in. OD by 14 in. ID by ½ in. thick was required, it would ordinarily be flame cut from ½-in. steel plate with a possible waste of the center section and the corners cut from 20-in. square. This is not important since the cost of the material is about 4¢ per lb and waste pieces can probably be used. However, in copper-base alloys, this would be a costly process since the material is of much higher cost and flame cutting is impractical. Here it would be definitely cheaper to produce this flange as a centrifugal casting, eliminating waste and cutting costs. In steel casting costs are roughly two and one-half times the plate costs; however, in nonferrous copper-base alloys, plate will usually cost as much or more than the castings. This fact together with the waste incurred in cutting from plate obviously precludes the economical use of plate for flanges.

The size and shape of any symmetrical casting that can be cast centrifugally is limited only by the size and horsepower of the casting machine itself. A rule-of-thumb for the design of a centrifugal casting is that the length should not exceed four times the bore diameter. This pertains to horizontal centrifugal casting machines set up for stationary pouring only. Centrifugal castings can be produced in almost any lengths providing a movable spout arrangement is provided to carry the metal over longer distances. The speed of rotation must be great enough to allow the metal to penetrate to the remote corners of the

ABOVE

FIG. 7—Section of impellers which have been spun-cast.

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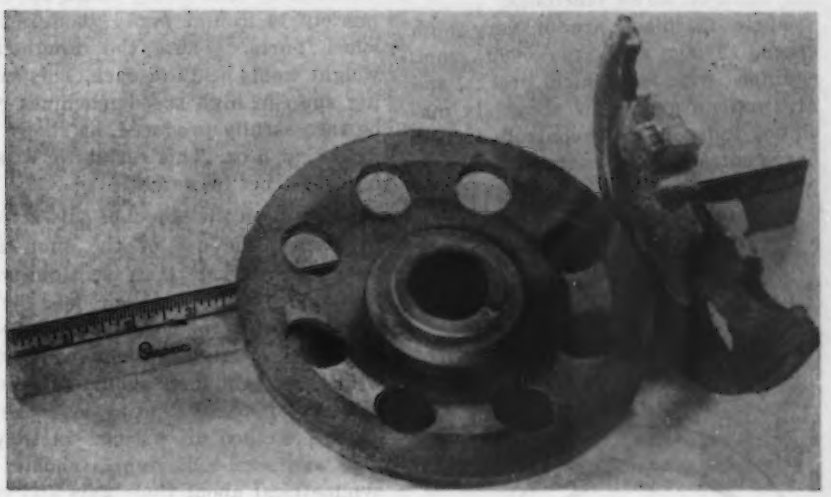

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FIG. 8—Thin-section spur gear blank centrifugally-cast in aluminum bronze.

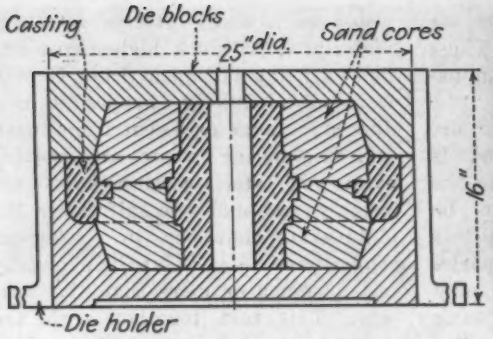

FIG. 9—Layout for an aluminum bronze worm gear blank cast to shape.

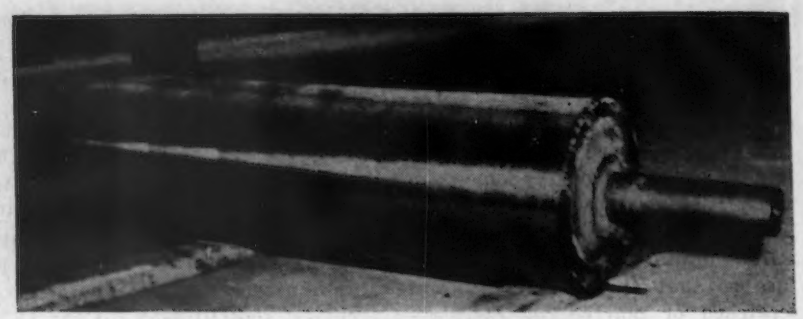

Fig. 10—Aluminum bronze horizontal centrifugally-cast roll used in a tin mill.

mold before freezing. The above applies mainly to copper-base alloys in which turbulence of the molten metal must be held to a minimum.

Castings vs. Bar Stock

It has been found in some instances that small flanged bushings (where the flange is large in comparison to the OD of the bushing and not exceeding 1 lb cast weight) can be more economically produced in small centrifugal casting machines than from bar stock on screw machines.

These machines are of very high speed, 3000 rpm to 5000 rpm, equipped with mechanical brakes, and arranged in groups of about six machines independently controlled from one central control station. These produce castings at a high rate of production when properly synchronized with the pouring operation. They allow the casting to be produced to shape with 1/32-in. stock on the side; thereby reducing the weight from the standard straight wall bar stock as well as reducing the machine time.

Consider for instance the finish part shown in fig. 11. Normally, this would be produced in bars 2 in. diameter solid by 16 in. long allowing 4 in. as a riser to feed the casting. This bar as-cast would weigh approximately 14 lb and would yield 16 finished parts. Thus, the rough-cast weight would be 14 oz each. This casting spun in high speed machines can be successfully produced, as shown in fig. 12, at 5 oz. This results in a saving of 64 pct in weight.

It has been the object of this article to discuss the use of the spun-cast method in other than straight-wall castings. Much has been done by a few concerns to develop this field. The design engineer not connected with these producers should take cognizance of the potentialities offered by this method of casting. In shape, true and semi-centrifugals should be symmetrical about their axis and circular. For instance, rather than design with, say, eight lugs to be drilled for bolt holes, it would be cheaper to design with a full flange. Bosses or pads on the OD should be eliminated wherever possible to facilitate drawing the casting from the mold. It has been shown that it is possible to core holes such as lightening holes in a gear web, but this slows down production and increases cost. A casting with a flange on one end is easily drawn from the mold, whereas a casting with flanges at each end cannot be drawn and requires split or composite molds. If any attempt is made to control the ID through the use of cores, even sections must be maintained. In designing worm gears, allow enough section in the web to feed the outer rim. Castings will have a certain amount of draft depending on the alloy used.

Through the centrifugal casting process, higher strength castings are consistently assured. The grain structure will be uniform, fine and dense. Where permanent molds are used, smooth surfaces result. More intricate shapes can be used by careful selection of mold materials. Costs may be reduced through higher yield and increased production.

A good many of the products shown in this article have been achieved in recent months, and only point the way to tremendous improvements to come in the postwar period.

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FIG. 11—Cast bar for use in screw machines to produce small flanged bushings.

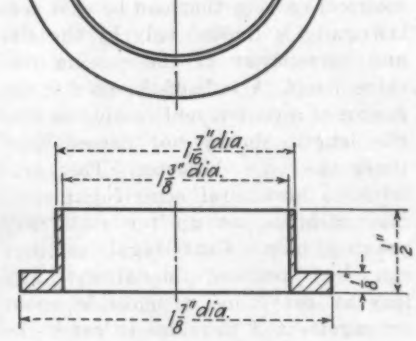
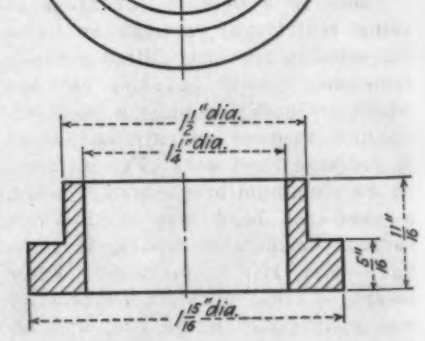


FIG. 12—Same part as in Fig. 11, only centrifugally cast and weighing less than one half as much.



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Automotive Bolts

. . . In concluding this two-part article, the author discusses the use of alloy steels for automotive bolts. The chief advantage of alloys for this purpose lies in its hardenability since, the author observes, there appears to be no difference in the ductility factor.

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BOLTS made from alloy steel should have the maximum physical properties obtainable from a given section.

In discussing carbon steel bolts, it was implied that it was difficult, due to the low hardness penetration characteristics of plain-carbon steel, to obtain the maximum physical properties for a given surface hardness. It was cited that increasing the severity of the quench in order to produce greater hardness penetration was a dangerous procedure.

As a general statement, due to the variable section of a bolt, it is better to harden using oil as a quenching medium and provide a steel with a sufficient degree of hardness penetration to insure complete hardening throughout the section. To fulfill this requirement there are a number of alloy steels available, as shown in table VI.

Strictly speaking, C-1041 is not an alloy steel, that is, according to steel pricing, but from a scientific standpoint there has been a definite addition of manganese for the purpose of imparting special properties so that it would be justifiable to class it as an alloy steel.

All the steels in table VI will harden by oil quenching to a surface hardness of 45 to 55 Rc and harden throughout the section up to ⅝ in. in diam. However, in bolt diameters ⅝ in. to 1 in. the AISI C-1041 manganese steel may not do so under all conditions.

As the question of selecting a steel for the bolt size depends to a great extent on the hardness penetration characteristics of the steel, the relative hardenability of the steels shown in table VI are given in fig. 15. These relative hardenability values are given in the form of end-quench test curves, this being the most commonly used test method. These values can be translated into terms of bar diameters. The end-quench curves calculated in terms of bar diameter using the J-45 values are shown in table VII. It should be understood that these values are only approximate as there is a variation within any one analysis range, due to chemical and grain size tolerances and also to certain heat characteristics, the cause of which has not been isolated.

It may be assumed that in order to obtain the maximum physical properties a hardness of at least 45 Rc must be obtained at the center of a bolt.

From the data shown in table VII it will be seen that there might be some doubt as to whether C-1041 steel would be suitable for a bolt over ½ in. in diam. As a matter of fact in actual practice a lower set of tensile values are required from this steel. See table VIII.

Using 8637 or 9437 the tensile values shown in table IX are maintained without difficulty. These values are obtained by quenching from 1550° F in oil and tempering from 900° to 1100°F. At this point it might be mentioned that alloy steel bolts are being austempered or hardened by quenching directly into a salt bath maintained at 600°F.

To the present, the tensile strength of the bolts has been given the leading role and it is given major consideration by designing engineers. Tables for individual types of bolts have been given as individual tables. It might be of interest to compare their tensile strength by grouping them. This is done in fig. 16. Of course, the most obvious thing about fig. 16 is that the bolts made from A-8637 and C-1041 have higher tensile strengths than the bolts made from C-1035 or C-1040 steel. But consider the hardness to which these bolts are heat treated, namely, a range of 22 to 32 Rc for the C-1035 or C-1040, 30 to 36 Rc for the C-1041, and 32 to 38 Rc for the A-

Fig. 15—Relative hardenability of alloy steels for bolts.

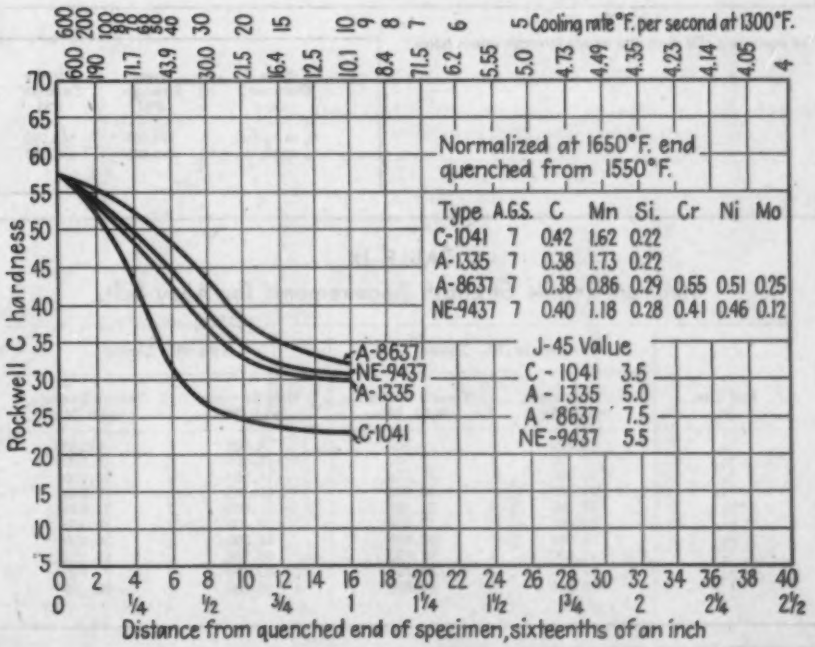

TABLE VI
Alloy Bolt Steels

AISI No.	Principle Alloying Elements	Average Content, Pct				
		C	Mn	Ni	Cr	Mo
C-1041	Manganese	0.40	1.50	....	....	....
A-1335	Manganese	0.35	1.75	....	....	....
A-8637	Nickel Chromium Molybdenum	0.37	0.90	0.55	0.50	0.20
NE-9437	Nickel Chromium Molybdenum	0.37	1.05	0.45	0.40	0.12

TABLE VII
Hardenability of Alloy Steels in Terms of Bar Size

Steel	J-45 Value	Bar Size and Location at which a Hardness of 45 Rc is Obtained, After Oil Quenching			
		Surface	¾ Radius	½ Radius	Center
C-1041	3.5	1.6	0.9	0.7	0.5
A-1335	5.0	2.2	1.3	1.0	0.8
A-8637	7.5	2.8	1.9	1.5	1.2
NE-9437	5.5	2.2	1.4	1.1	0.9

TABLE VIII
Minimum Tensile Strength Requirements for C-1041 Bolts

Bolt Size, In.	Coarse (NC) Thread		Fine (NF) Thread	
	Yield Strength, in Lb, Min	Tensile Strength, in Lb, Min	Yield Strength, in Lb, Min	Tensile Strength, in Lb, Min
¼	4,000	4,500	4,600	5,100
5/16	6,600	7,300	7,300	8,100
⅜	9,700	10,900	11,000	12,300
7/16	13,300	14,900	14,900	16,600
½	17,700	19,900	20,000	22,400
9/16	22,700	25,500	25,400	28,400
⅝	28,300	31,600	32,000	35,800
¾	38,800	44,500	43,300	49,600
⅞	53,600	61,400	59,100	67,800
1	70,200	80,600	78,900	90,400

The equivalent PSI yield and tensile strength values follow:

Bolts Diameter, In.	Yield Strength, PSI	Tensile Strength, PSI
¼ to ⅝ incl.	125,000	140,000
¾ to 1	116,000	133,000

TABLE IX
Minimum Tensile Strength Requirements for Alloy Bolts

Bolt Size, In.	Coarse (NC) Thread		Fine (NF) Thread	
	Yield Strength, in Lb, Min	Tensile Strength, in Lb, Min	Yield Strength, in Lb, Min	Tensile Strength, in Lb, Min
¼	4,300	4,800	4,900	5,500
5/16	7,100	7,900	7,800	8,700
⅜	10,500	11,600	11,900	13,200
7/16	14,400	15,900	16,000	17,800
½	19,200	21,300	21,600	24,000
9/16	24,600	27,300	27,400	30,400
⅝	30,500	33,900	34,600	38,400
¾	41,800	46,800	46,600	52,200
⅞	57,700	64,700	63,700	71,400
1	75,700	84,800	85,000	95,200

The equivalent PSI yield and tensile strength values follow:

Bolts Diameter, In.	Yield Strength, PSI	Tensile Strength, PSI
¼ to ⅝ incl.	135,000	150,000
¾ to 1	125,000	140,000

8637 steel and bear in mind that hardness is directly related to tensile strength, and then ask why not increase the hardness of C-1035 or C-1040 to the same hardness range as the alloy steel. There is a good reason why this cannot be done and that has to do with the difference in the hardenability of the two types of steel. In order to obtain the same tensile strengths the carbon steel would not only have to be treated to the same surface hardness but also to the same hardness throughout the complete cross-section. This requirement could only be met by very severe water quenching with the consequence that cracking would become too prevalent to permit its application in economic production. In fact in the case of one size, ¼-in. bolts, it is possible to obtain the same tensile properties as obtained from alloy steel by oil quenching to the same hardness range as used for alloy, namely, 32 to 38 Rc. Fig. 17 illustrates the difference in hardness penetration between a carbon and an alloy steel.

Plasticity

The question of the plasticity of heat-treated bolts has not been given much consideration so far in this article. This is usually referred to as ductility and is measured by the elongation or reduction of area values in tension testing. There seems to have been, at least in the past, and most metallurgists seem to have been guilty of it, a tendency to regard alloy steels as having some special mechanical properties not attainable in carbon steels. Aside from the question of hardenability, that is assuming that sections of alloy and carbon steels are hardened throughout the test sections, there really appears to be no difference in the ductility factor. Fig. 18 gives a comparison of carbon and alloy steel using a P-value (Schenck) which is a value showing the relationship of the tensile strength to the reduction of area.

Fig. 18 covers 100 heats of fine-grained carbon steel heat treated in ASTM 0.500-in. test bar size by quenching in water from 1550° F and tempering at 900° F to a hardness range of 25 to 35 Rc.

The tensile strength range was 130,000 psi to 170,000 psi and the re-

duction of area 50 pct to 65 pct, and also 100 heats of fine-grained alloy steel consisting of 36 heats of 3140, 14 heats of 4340, 20 heats of 4640 and 30 heats of 9440, heat treated from 1550° F in ASTM 0.500-in. test bar size by quenching in oil and tempering at 900° F to a hardness range of 29 to 39 Rc. Their tensile strength range was 160,000 psi to 200,000 psi and their reduction of area 47 pct to 60 pct.

The setting up of a specification governing the plasticity of a finished bolt presents some difficulties, for it is impossible to maintain a constant gage length when determining the elongation and difficult to measure reduction of area on a broken threaded section.

In the case of the elongation the major part occurs in the threaded section and very little in the body even though the body is exposed to the tensile stress. Tentatively, the following minimum limits are imposed:

Steel	Minimum Elongation in Inches over the Original Length of the Bolt
C-1018	¼
C-1035, C-1040	⅛
C-1041	⅛
A-8637	3/32

The evaluation of the mechanical properties of finished bolts has been confined in this article to tensile and yield strength and to plasticity measured as elongation or reduction of area. Of late considerable attention has been paid to the fatigue strength of bolts.

To increase fatigue strength different types of threads have been studied. Decarburization at the root of threads was mentioned earlier as a cause of a decrease in fatigue strength and recarburization in hardening was suggested as a means of overcoming this. Shot peening has also been explored as a means of increasing the fatigue strength with some promise of success.

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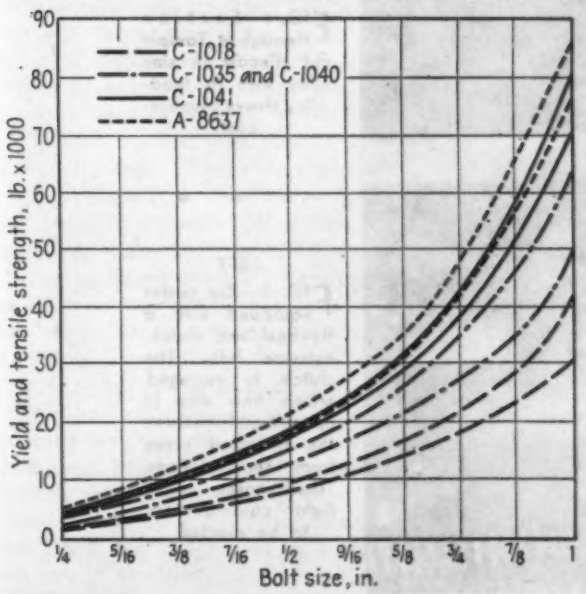
FIG. 16—Minimum yield and tensile strength values for bolts.



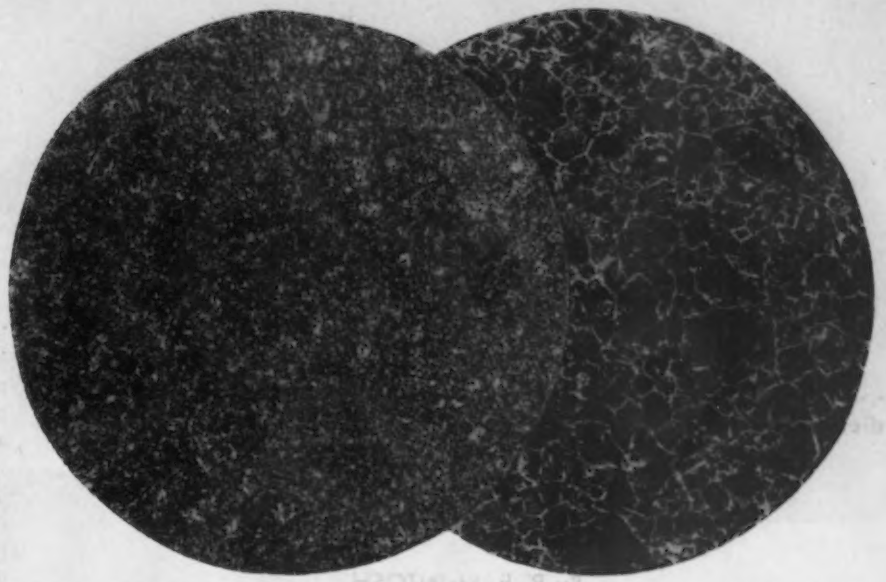


FIG. 14—Microstructure of a completely hardened (left) and an under-hardened (right) bolt. Both were tempered to 22 to 32 Rc. Nital etch at 100 X.

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FIG. 17—Comparison of hardness penetration properties of carbon and alloy steels. Heat treatment = normalized at 1650° F, heated to 1550° F, held 35 min and oil quenched

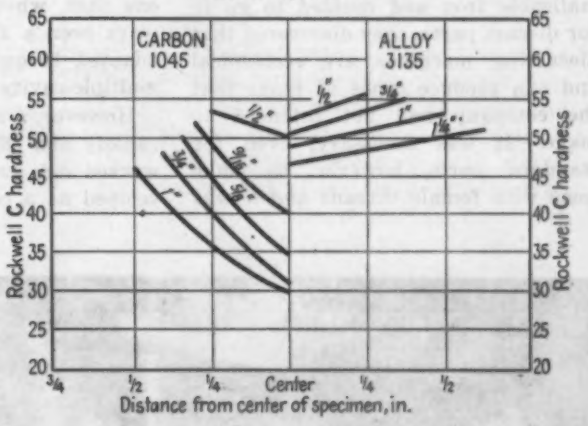

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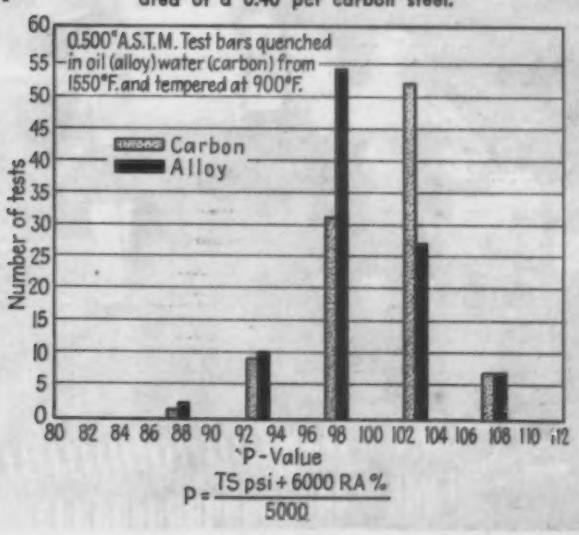
FIG. 18—Relationship of tensile strength to reduction of area of a 0.40 pct carbon steel.



Diecasting Close-Fit Threads

. . . Close-fit threads are secured without tapping or chasing, by diecasting in zinc alloy. There is no parting in the axial plane, hence there is no flash on the thread itself.

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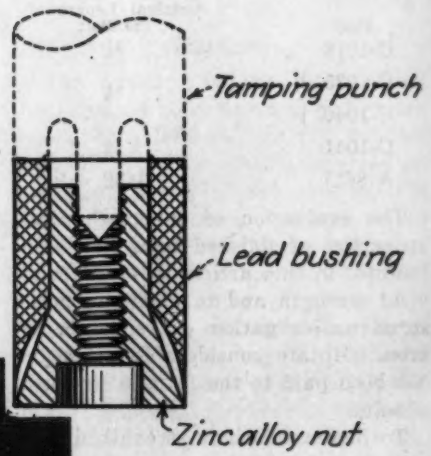
By R. E. McINTOSH
J. Edward Ogden Co., New York

o o o

WHEN the makers of Star expansion bolts turned some of their products from the use of malleable iron and decided to go in for diecast parts, they discovered that diecasting machines are economical and can produce types of parts that the company had not intended to make. It was necessary, even for standard parts, however, to make some with female threads and it was decided to avoid tapping these if possible. This meant unscrewing cores, a somewhat uncommon procedure and one that, when used, had nearly always been a slow operation not well adapted to quantity production with multiple-cavity dies.

However, a method of doing the job rapidly and efficiently was ultimately worked out and patented. When developed as a commercial process, the method proved to be applicable for male as well as for female threads and to be capable of adaptation to jobs not thought of initially. It has been found that threads as fine as 32 per in. internal and 36 per in. external are producible in the Zamak alloy used. Class-2 fits can be held, where necessary, without any tapping or chasing, and it is not impossible to convert such threads into Class-3 fits if the cost of tapping or chasing can



ABOVE

FIG. 1—Section through a Tampin nut diecast in zinc alloy with its lead-alloy sleeve also diecast.

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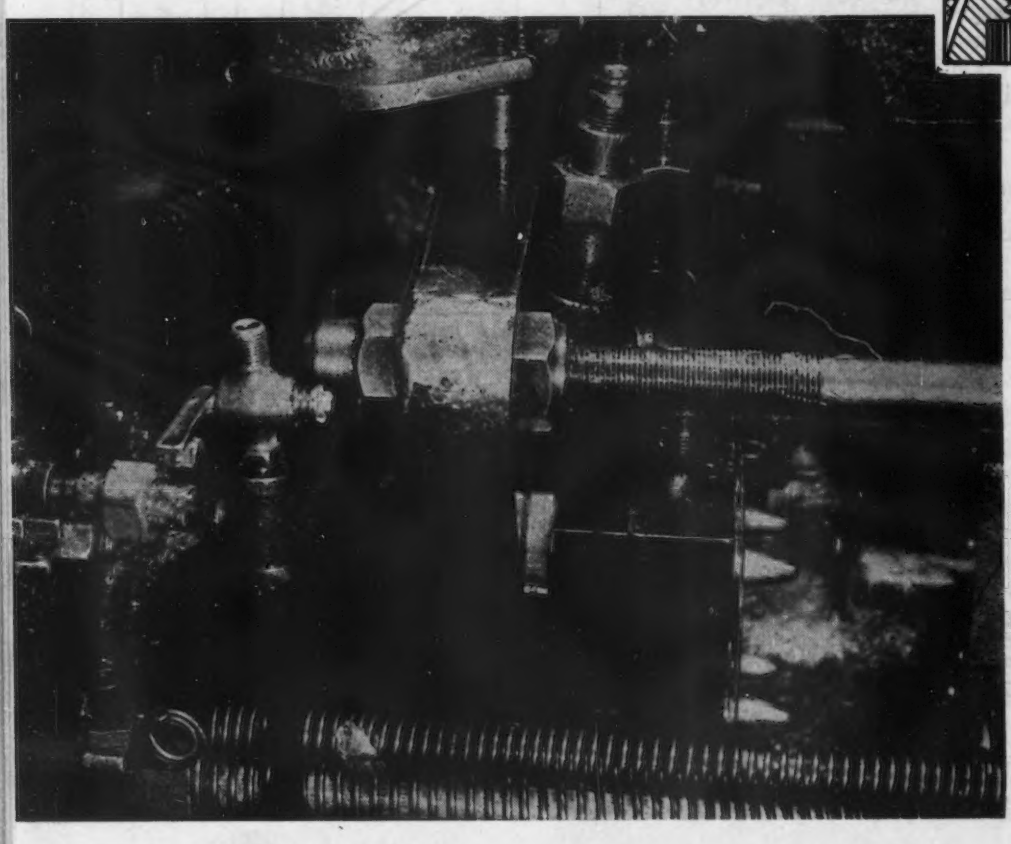

LEFT

FIG. 2—Kip caster equipped with a flywheel and clutch, extreme left. The clutch is engaged when the die is opened and unscrews the threaded cores from the castings (shell noses, lower right) causing them to be ejected.

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RIGHT

FIG. 4—Punch press setup showing a gate of lead Tampin sleeves with a nut set into each. When the die closes, the nuts are forced onto the sleeves and the latter are sheared from the gate.

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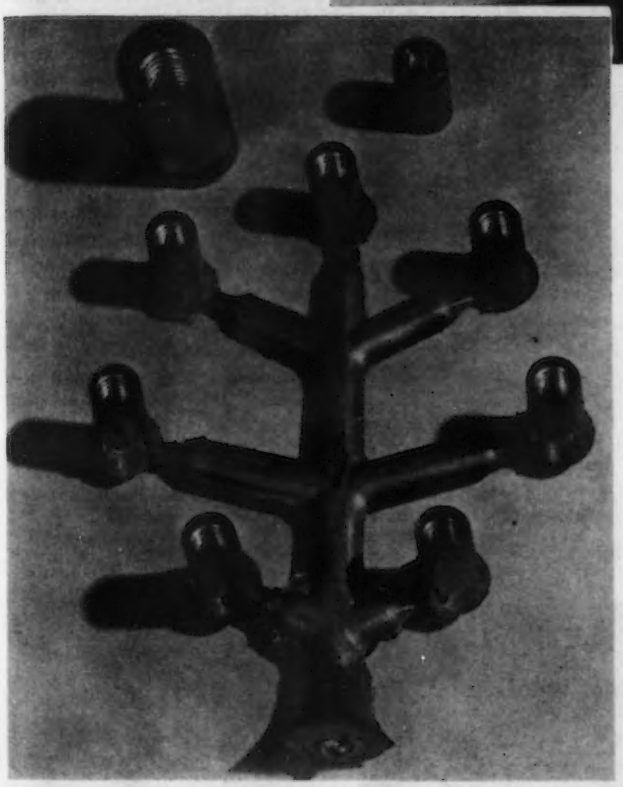

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LEFT

FIG. 3—Gate of die cast Tampin nuts. Above are two nuts with lead sleeve assembled thereon.

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be borne, although this may not be the most economical procedure.

One of the largest production jobs done with the Madison-Kipp casting machines used is that in which nuts for Tampin anchors are cast in multiple-cavity dies. These nuts are made in eleven sizes from 6/32 in. to ¾ in. The nuts, fig. 1, are cylindrical for about two thirds their length and are tapered or flared outside over the remaining length. Each nut has four nibs where the cylindrical and tapered sections join, to keep the nut from turning when set in a hole.

The die for casting nuts has a threaded core centered in each cavity. Each core has a shank that passes through the die wall and is keyed to a spur pinion meshing with a central gear. This gear is pressed on a shaft that turns in bearings and extends backward through the die box. At its rear end, the shaft has a hex end to fit a clutch hub that slides thereon. When the die is closed, the clutch is disengaged and the shaft does not turn but, as the die is opened after casts are made, a link engages the clutch with a flywheel (extreme left, fig. 2) that is kept turning by a belt to a motor pulley. Engagement causes the clutch, shaft and gear to rotate and the pinions meshing with the gear also turn, of course. In so doing, they unscrew the cores from the nuts. As the cores do not move axially, the nuts are run off the cores and the whole gate (including the runners, still attached to the nuts), fig. 3, is ejected and is lifted out by the operator.

Actually, the process is semiautomatic. All the operator has to do is to operate the controls that open and close the die, trip the metal-injecting ram and, as the die opens, lift out the gate of castings. This makes the cycle quite rapid and yields a threaded nut for each cavity in the die. Cores have lapped threads to make them easier to unscrew and are occasionally lubricated by the operator.

Nuts thus made are first sheared or tumbled from the gate. Nuts are then sent to another department where lead sleeves are cast, several to a gate. A girl then sets a nut in each sleeve, fig. 4, and places the gate in a trim die in a punch press. As the punch descends, it forces the nuts into the sleeves and cuts the sleeves from the gate, performing an assembly operation at the same time that flash and gate are sheared off. Two assemblies made in this manner are shown at the top of fig. 3. The lead sleeves, as shown in fig. 1, have a tapered surface mating with that on the nut and are diecast in separate machines in a department well removed from those for casting the zinc-alloy nuts in another part of the plant. Assemblies of this type are used in holes drilled in concrete, masonry and the like. When in place, the outer lead sleeve is tamped with a tool that expands it into the hole, giving a firm grip in the masonry. Millions of these assemblies are used annually for building and construction work.

Cones and sleeves for stud bolt anchors are diecast in a similar manner but they have somewhat different proportions.

In parts that require a male thread, the same general type of die, with identical flywheel and clutch arrangement, is applied but, instead of the die cores having male threads they have tapped holes. In casting, the molten

FIG. 5—Gate of five 20-mm shell noses diecast with male thread. A casting sheared from the gate and ready for inspection is seen in lower right corner.

zinc alloy is forced into the thread of the tapped hole and a male thread is formed on the casting. The core, in this case, is easier to unscrew than a core having a male thread because, as the metal solidifies, it shrinks away from the tapped thread that forms it.

A gate of five 20-mm shell noses cast with male thread is shown in fig. 5, along with one separate casting after it is sheared from the gate. These conical parts (having an unthreaded cored hole) require no machining whatever save that of shearing from the gate in a five-cavity trim die. Upon being sheared off, the castings are ready for inspection and delivery. Casting is done at the rate of 200 shots an hr and trimming is done even faster. The threads have to meet class-2 specifications and, when a part is screwed into a nut in an inspection fixture, and rotated about the thread axis, the tip of the casting must not run out more than 0.010 in. total indicator reading. Weight variation in the individual nose castings is held within ± 7 grains.

Such a part, as compared with its equivalent made on a screw machine,

FIG. 6—Most of these parts are diecast with either male or female threads. At top are two diecastings that have had edges spun over to hold a mica disk. Dark parts in center row are Lord rubber mounting one being spun into a diecast ring.

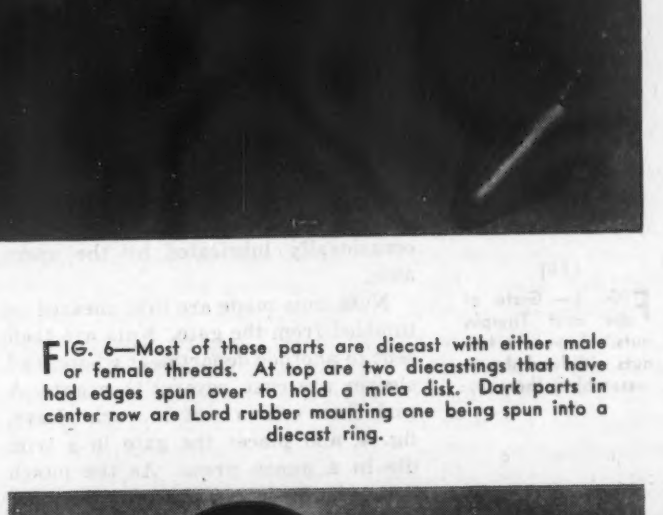
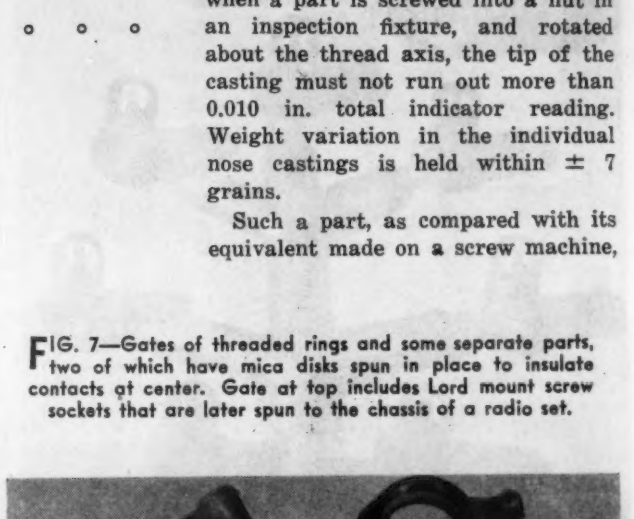


FIG. 7—Gates of threaded rings and some separate parts, two of which have mica disks spun in place to insulate contacts at center. Gate at top includes Lord mount screw sockets that are later spun to the chassis of a radio set.



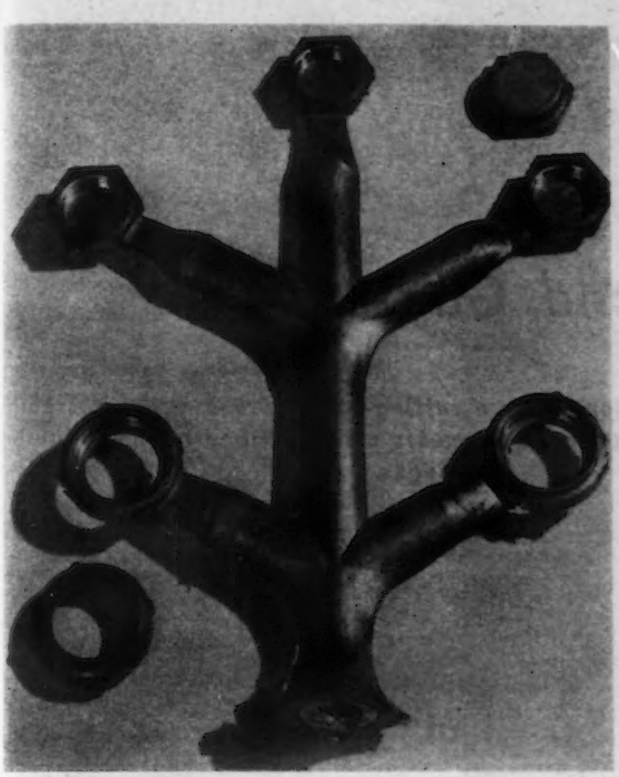


FIG. 8—Gate of diecasting, the lower ones being threaded ring sockets for Lord mounts. At top are cap nut castings with cast thread going clear to bottom.

FIG. 9—Gate of zinc-alloy shield diecastings and, at bottom, a pair of shields cast to fit the lag screw shown.

is less expensive, as only the casting and trimming operations (both done five parts at a time) are required. If cut from bar stock, about half the metal would be converted into chips and the part would require forming, necking, threading, facing, drilling and cutting off, besides deburring in a transfer attachment or in a separate machine.

It is significant that, in diecast parts made in this manner, there are no ejector pin marks on the castings as they are ejected by unscrewing the cores. Moreover, male threads go clear down to a shoulder and so do female threads, if there is a shoulder or a bottom in the hole. This is not possible with chased or tapped threads and, in effect, for a given thread length, makes possible a shorter piece.

Fig. 6 shows several parts diecast in zinc alloy in the manner described. Some have male and some female threads. In figs. 7 and 8 some of the same parts are shown as-cast on the gate and separately. All these parts are for use in radio applications and all (except certain of the parts in fig. 6) have taken the place of much more expensive and less satisfactory screw machine products. At the top of fig. 6 are two diecast rings into each of which mica disks have been set. Then the edges of the rings have been spun over to hold the disks in place. (Parts in center of disks are electrical elements not diecast.)

In the center row, fig. 6, are diecast hex parts the uppermost of which has received a Lord rubber mounting that is vulcanized to a steel disk. This disk is shown spun in place (top of middle row fig. 6) and separately, next to bottom in this row. After being spun in place, the assembly is screwed into a socket of the type shown separately with cast female threads, lower part of fig. 8. Such sockets have a lip above a shoulder and, after being set in place in a hole pierced in the alu-

(CONTINUED ON PAGE 96)

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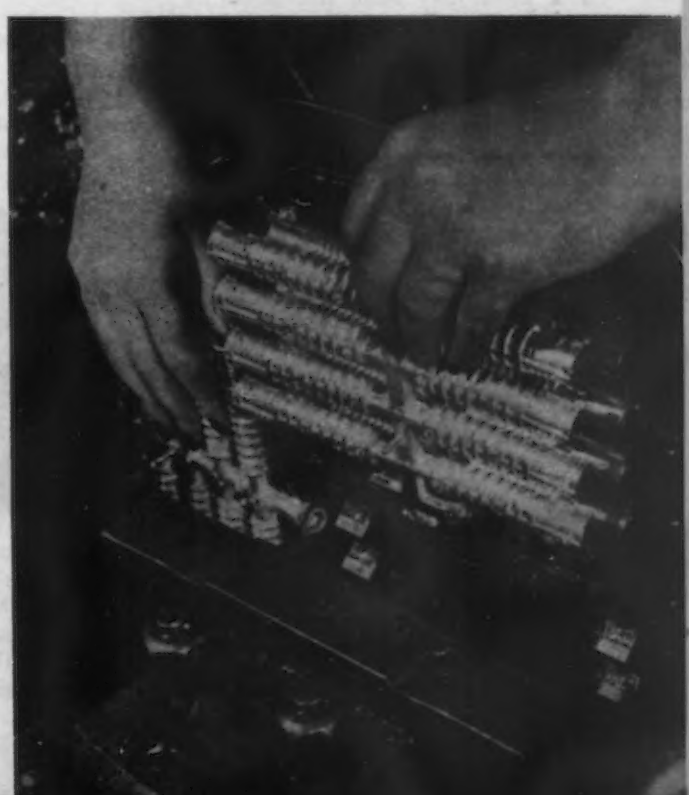

FIG. 10—In this setup, a trim die clinches lugs that fasten the pairs of shields on two gates together and then shears the shields from the gate. The same die has a knife that cuts the sprue from gate held by the operator's right hand.

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New Equipment

Small Tools and Gages

. . . Recent developments in cutting tools, lathes, drills, fastening devices and measuring instruments are described in the following pages.

A DIAMOND wheel coolant especially prepared and compounded for use on Zurium bonded diamond wheels has been announced by *Industrial Abrasives, Inc.*, 3724 West 38th St., Chicago 32. The coolant clings tightly to the diamond surface and forms a film which prevents hot chips from imbedding themselves between the diamond teeth so that the wheels can clean without loading or glazing and therefore can cut free and cool. The coolant is said to be non-irritating and non-toxic and will not injure the hands or clothes of operators. It is sold in concentrate form which mixes with 20 parts of plain water and can be applied by pump, wick, or drip feed in sufficient quantity to keep the diamond surface fully wet.

Abrasive Tool

AN abrasive tool, the Handee Finisher, has been announced by *Master Specialty Co.*, 5700 Cedar Ave., Minneapolis 7. Six 12-in. abrasive strips can be placed on the unit at one time. When the outside strip is worn, it can be removed and the next strip tightened in place by means of the knob on the handle. A new abrasive cloth is consequently instantly available when desired. Hardened tools and dies can be smoothed and polished in a minimum of time. The finisher smooths and polishes hardened tools and dies, deburrs intricate stampings and removes file and grinder marks from castings.

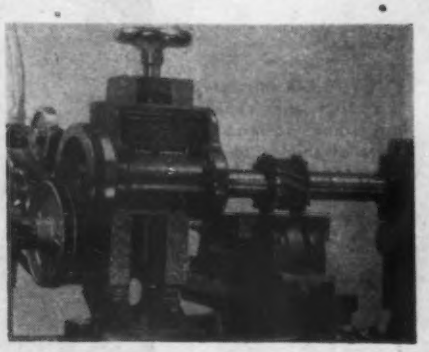
Dressing Tool

A DRESSING tool, the Super-Cut Circle Set, has been announced by *Industrial Abrasives, Inc.*, 3724 West 38th St., Chicago 32. The tool consists of three parts, the circle set insert impregnated with diamonds, ⅛ in. deep and ⅛ in. wide, the holder and one set screw. It contains over 5 carats of specially selected diamonds uniformly distributed in the insert. All diamonds are completely imbedded and solidly locked in the special matrix which holds them firmly until completely used up. As the top layer of diamonds wears down, other diamonds are uncovered and come into cutting position so that at all times several diamond points are simultaneously in contact with the cutting wheel.

The set is used either horizontally or vertically against the abrasive wheel.

Lathe Attachment

A MILLER which converts a lathe in less than 3 min into a combination machine has been announced by *Globe Products Mfg. Co.*, 3380



Robertson Blvd., Los Angeles 34. The miller is an attachment which fits the ways of the lathe and its operation is identical with that of a standard milling machine, except that the spindle is moved into position to engage the work rather than the work lifted to engage the spindle. It is also said to increase the swing of a small lathe by almost double.

Drillhead

A TWO-SPINDLE offset-type drillhead in which one spindle is built integral with the drive shaft and the other is offset and adjustable for variable centers has been announced by *Thomson Industries, Inc.*, 29-05 Review Ave., Long Island City, N. Y. The three sizes most in demand have spindle provided with ¼-in. capacity chucks, Nos. 1 or 2 Morse taper and are available from standard designs. The drillhead is of ball bearing construction, having all vital parts completely enclosed running in grease.

Anchor Nut

A FLOATING anchor nut with replaceable standard nuts has been announced by *Kaynar Mfg. Co.*, 820 East 16th St., Los Angeles 21. It is offered in sizes from No. 6-32 to ⅜ in.—24. The unit consists of a base, a retainer, a standard nut and a patented steel spring clip all assembled. The clip holds the nut securely in place but can be disengaged by prying up with a screwdriver. The nut floats in all directions which is said to permit self-alinement of the nuts with the bolt axis. The base is fabricated from high strength ST aluminum and has high resistance to torque and thrust. Flanges will not

bend and nuts cannot be pushed out. It can be used with high temperature nuts, up to 650° F.

Impact Wrench

A ¼-in. capacity pneumatic impact wrench with straight type grip and lever control has been announced by *Aero Equipment Corp.*, Bryan, Ohio. Through its torque control mechanism, stretching or "burning" of threads is said to be eliminated. It has a calibrated adjusting screw on the side of the motor that enables the operator to set any bolt or nut to any desired tension. Control is obtained through the construction of the roller clutch impacting mechanism which consists of four major parts, anvil, hammer and two cylindrical steel rollers. When in operation the centrifugal force throws the two steel rollers out against the hammer where they are caught in shear between the hammer and anvil members. This transfers the full torque through to the work in the form of a sudden impact. When the selected torque is obtained, the rollers rebound from the anvil face and do not allow the hammer to engage for impact. This method of impacting is said to prevent any stretching of the threads on either the stud or bolt and is said to guarantee maximum torque.

Improved Measuring Projector

IMPROVEMENTS in its measuring projector has been announced by *Bausch & Lomb Optical Co.*, Rochester, N. Y. An anti-reflection

coating applied to condenser lenses is said to increase screen illumination. Roof prisms are silvered to give them permanent reflecting surfaces. A 26 pct brighter screen image is said to result from these production changes.

Lock Nut

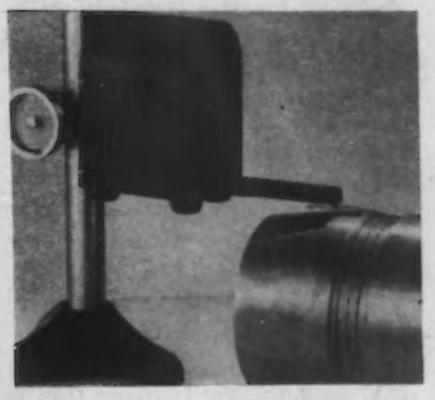
A LOCK nut has been developed by *F. D. Saylor & Son*, 13095 Greeley Ave., Detroit 3. Called the "Saylor Sticky Nut," the product is a standard nut chemically treated to adhere tightly to the bolt.

Collet Chuck

A COLLET chuck of 3½-in. capacity has been added to their line of collet air chucks according to an announcement by *Redmer Air Devices Corp.*, 601 West Washington Blvd., Chicago 6. The chuck uses a special type 3½-in. collet. Various size pads can be had to reduce the hole diameter to the desired size. The collet remains stationary. The opening and closing is controlled by the sleeve. By this method, the depth of the work can be controlled even though there are variations in the diameter of the work to be held as there is no up or down movement of the collet.

Rough Finish Measuring Head

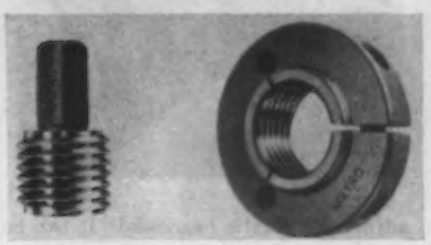
A ROUGH finish measuring head for checking the rougher surface finishes and waviness in metals,



glass, plastics, plated and painted materials has been announced by *Brush Development Co.*, Cleveland. The pickup and drive head measures irregularities from 100 to 3,000 m in. peak to valley.

Chromium Plated Gages

A LINE of hard chromium plated thread plug and ring gages has been announced by *Metro Tool & Gage Co.*, 4246 West Peterson Ave., Chicago. The gages are made in sizes



0 in. to 1½ in., ring gages ¼ in. to 1½ in. It is claimed that the gages will not chip.

Metric Gage Blocks

A SERIES of metric gage blocks has been announced by *Continental Machines, Inc.*, 1301 Washington Ave., South, Minneapolis 4. The blocks are offered in two grades that correspond in accuracy with the English system. Inspection quality is guaranteed accurate within + or —0.0001 mm and working quality within + or —0.0002 mm. The set consists of 38 blocks and 2 wear

blocks (of tungsten carbide in the inspection grade) and is capable of producing over 100,000 combinations ranging from 1.01 mm to 100 mm in increments of 0.01 mm. A special 1.005 mm block makes possible special combinations for closer tolerances, where necessary. The blocks are guaranteed to exceed a hardness of 65 Rockwell C.

Plastic Berger Loupe

A PLASTIC Berger loupe has been developed by *American Optical Co.*, Southbridge, Mass. The loupe possesses a light-weight plastic frame which is held before the eyes by an

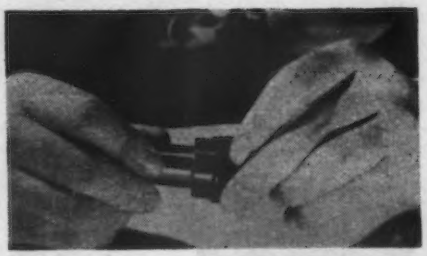
adjustable elastic headband. It can be worn over correction glasses. Precision ground lenses give a magnification of 2.5 X.

Dial Indicator

A SHOCK absorbing mechanism "Cushioned Movement" has been built into their dial indicators by *Federal Products Corp.*, Providence, R. I. The function of the "Cushioned Movement" is to absorb the impact of sharp blows or rough handling so that their force is cushioned before it reaches the small gear teeth, jewels, pivots or other intricate parts of the indicator mechanism and causes basic injury to the instrument. Regular Federal dial indicators now in use (with the exception of B sizes) can be returned to Federal for installing the movement at a nominal cost.

Protective Coating

FOR the protection of gaging surfaces of plug, thread and special gages, a plastic coating called Jan-Seal, applied to the gage by dipping,



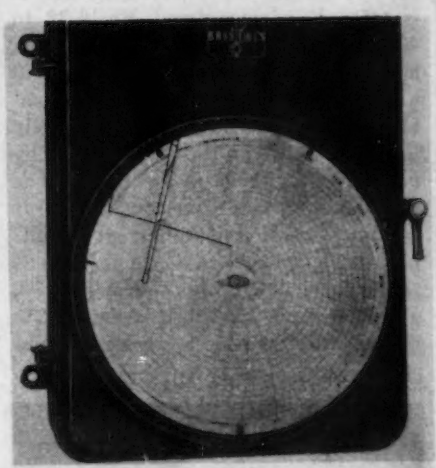
has been announced by *Janson Gage Co.*, 19208 Glendale Ave., Detroit 23. The coating is said to keep the tool in perfect condition during shipment and storage. It is easily removed and replaced after use. In addition to affording protection against rust and corrosion, the coating is said to protect the gage against damage from dropping or being struck.

Magnetic Strainer

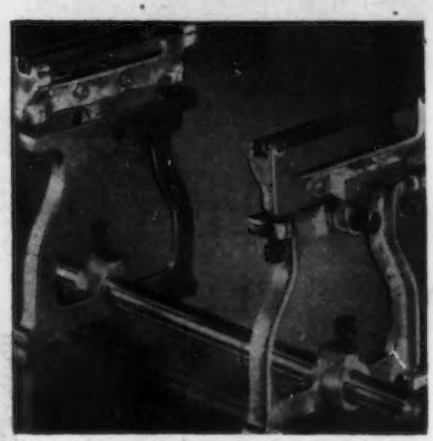
COMBINING the effect of powerful permanent magnets with fine screening to remove filings and metal particles from oil systems or other liquids, a magnetic strainer, Model 200-MS-1 Winslow Duplex, has been developed by *Winslow Engineering Co.*, Oakland, Calif. Two cylindrical baskets consist of a main body of perforated steel, within which are fine wire mesh linings. The magnets are suspended within these baskets. The one-piece body incorporates the manifold, strainers, inlet and outlet connections, by-pass valves, pressure regulator and main control valve. As a safety factor, flow is maintained through either one or both strainers regardless of the position of the valve control lever. The strainer handles 15 gpm. Where finer filtration of liquids is necessary, cartridge type conditioners can be used together with the strainer. Aside from their use in the turbo-generator field, the strainer can be used in the filtration of cutting oils used with machine tools, the filtration of oil used in large speed reducing or speed increasing gears, and on run-in test-stands for gasoline, Diesel or steam power units

Running-Time Recorder

AN instrument for recording machine running time has been developed by *Bristol Co.*, Waterbury 91, Conn. The instrument records the



operating or "on" time of production machinery and other similar equipment. The chart record gives the total "on" time in hours, minutes and seconds for a given period. "Off" periods are also shown on the chart as well as the time at which they occurred. The running-time readings are magnified in such a way that the total operating time of a machine can be determined to within a few seconds.



Static Balancer

A STATIC balancer for putting rotating parts in static balance has been announced by *Samuel S. Gelber*, 34 South Jefferson St., Chicago 6. The 9-in. model, illustrated, has a finger tip span adjustment up to 9½ in. Swing capacity is 9 in., supporting capacity 50 lb and shipping weight 2 lb. A piece of plate glass can be supported on the balancing ways and leveled by means of the finger tip leveling adjustments, providing a surface plate for precision inspection. Two larger models are available in the 20 and 30-in. size.

Oilgear Fluid Power extends range of amazing wire coating machines

The John Royle & Sons tubers are amazing machines that are coating millions of feet of wire with rubber or plastic insulation each week to meet the exacting requirements of the Signal Corps. Previously, not one of these tubers could produce its full capacity; the mechanical transmissions with which they were equipped originally just were not broad enough in their speed range to permit *one* standard tuber to coat *many* different sizes of wire uniformly with the required thickness of rubber or plastic.

But Oilgear Fluid Power could meet that need . . . and did. The Oilgear Transmission gives a broad range of controlled speeds to the capstan and rewind drive of this machine, enabling the latter to handle more sizes of wire and to do a much better job of coating the wire it handles. Similar benefits can be yours . . . if you will investigate the amazing possibilities of Oilgear Fluid Power for your straight line feeds or rotary drives. No matter what your power transmission problem is, you should know what Oilgear can do. THE OILGEAR COMPANY, 1303 W. Bruce St., Milwaukee 4, Wisconsin.

Oilgear Fluid Power enables this John Royle & Sons tubing machine to process many sizes of wire with required thicknesses of coating.

ARE YOU TRYING TO:

1. Apply large forces through long . . . or short . . . strokes at variable speeds?
2. Obtain automatic work cycles, variable speeds in either direction . . . with or without preset time dwell?
3. Apply large forces through continuous or intermittent reciprocating cycles at constant or variable velocities?
4. Obtain extremely accurate control of either position or speed of a reciprocating member?
5. Apply accurately variable pressure either static or in motion?
6. Closely synchronize various motions, operations or functions?
7. Apply light . . . or heavy . . . forces at extremely high velocities through either long or short distances of travel?
8. Obtain continuous automatic reversing drives at constant R.P.M. or over a wide range of speed variation?
9. Obtain accurate remote control of speed and direction of rotation, rates of acceleration and/or deceleration?
10. Obtain constant horsepower output through all or part of a speed range?
11. Obtain automatic torque control?
12. Obtain accurately matched speed of various rotating elements?
13. Obtain constant speed output from a variable speed input?
14. Obtain full preset automatic control, elimination of problems of shock, vibration, etc.?

You Need Oilgear!

OILGEAR Fluid Power

Assembly Line . . . .

STANLEY H. BRAMS

• OPA, CIO cause some industry misgivings, but schedules still hold . . . Kaiser-Frazer want Willow Run . . . Materials situation clears.

DETROIT—The automobile industry was bedded down last week, transiently troubled over a few details, but benignly certain that a full delivery of cars would be made on schedule.

Some misgivings came with a gumshoe visit to individual producers of OPA representatives bearing the new pricing formula. The OPA-ers said nothing while in town; the press whispered in double banner speculative headlines. The companies, recalling the difficulty the public had in understanding the workings of something as comparatively simple as the atomic bomb, wisely left the explanation of the pricing formula up to Chester Bowles, OPA administrator.

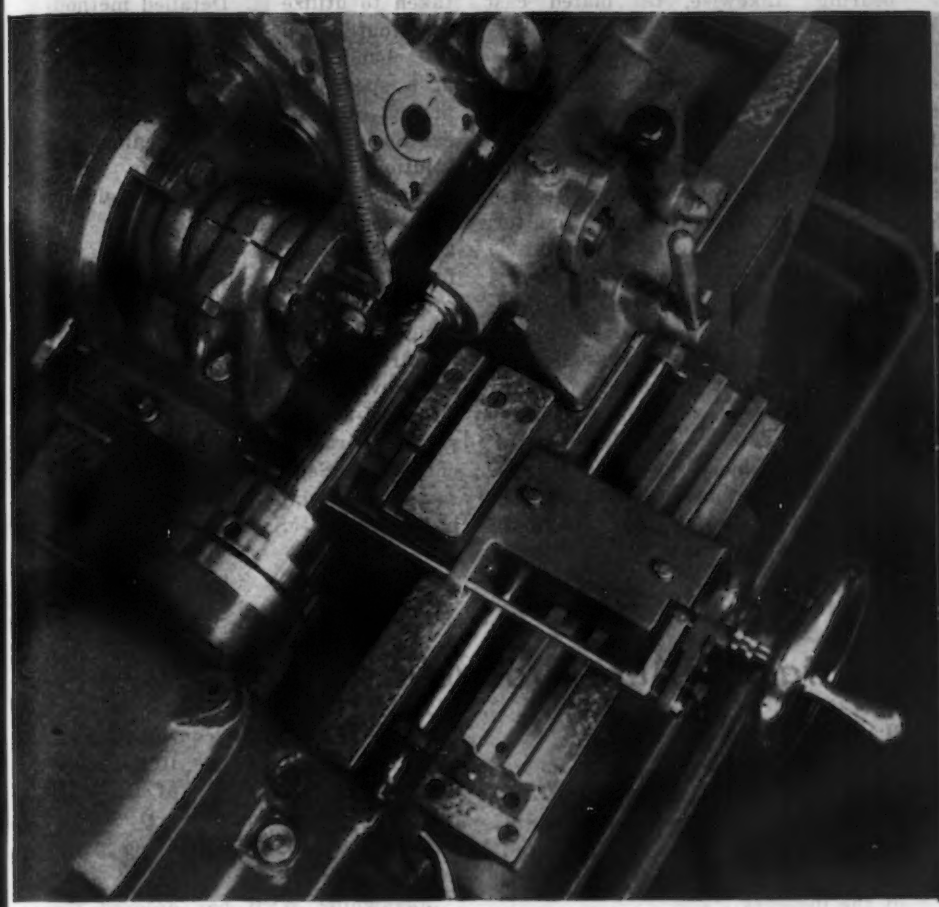
Premonitory labor pains were provided by the CIO United Auto Workers. A sharp twinge came when Walter P. Reuther, head of the union's General Motors department and self-appointed counselor to the industry on assorted matters, served notice on GM for a 30 pct wage increase for 300,000 workers. Reuther felt the corporation was well able to pony up the raise without boosting prices, thus conforming to government stabilization policy. His goal was to maintain take-home-pay, which he said had been reduced 30 pct by reduction to a 40 hr week. Tossed in was a suggestion, which no doubt will be studiously ignored, that General Motors call an industry-wide conference to negotiate the increase on an industry basis. This would allow the union to blend all its contract eggs into an omelet instead of heating the pan for each company separately. Individual pans were being heated, however. Demands for the 30 pct boost also are being served on Chrysler and Ford, with the pullet sized manufacturers due to follow.

The Willow Run bomber plant, often branded a white elephant, seems fair to change its spots, if we may be allowed a metaphorical halfbreed. Henry Kaiser, characteristically quick on the uptake on war plants in which others show elaborate disinterest, and Joseph Frazer acknowledged that their Kaiser-Frazer Corp. was attempting to negotiate a five year lease on the one-time world's largest-airplane-factory-under-one-roof. The main plant would be used for initial production of the medium priced Frazer car, the new Frazer "Farm Rite" tractor, the pint-sized Rototiller soil preparer AND the low priced Kaiser car. That the Kaiser automobile will be initially a refugee from West Coast production surprised no one here. Construction of hot and cold rolling sheet facilities at Kaiser's Fontana steel mill, which presumably will supply steel for the car, are not yet under way, and may take as much as a year to complete. Thus, even though a body plant could be assembled on the Coast in jig time, which is problematical, sheet steel would have to be hauled from the East, much of it by rail freight—and this is expensive. For that matter, despite the Coast's expansive pride that complete automobiles will be sired there, it is questionable whether many of the mechanical components, other than the motor block, may be of far Western origin for a number of years.

Consider, for instance, the time and expense involved in setting up facilities in an area where none have existed before for production of clutches and transmissions. Unless other automobile builders decide to make more comprehensive their Coast assembly operations, which is possible, the unproven Kaiser car will be the sole passenger car consumer. Unless the Kaiser "takes" with a gusto

DETROIT PROBLEM: *While the automotive industry struggles to get into volume production in October, the city wrests with the problem of an unofficially estimated* 200,000 *unemployed. USES gets the application for new jobs and unemployment compensation.*

THIS is the way to mill a Taper Thread . . .



The machine is a standard Pratt & Whitney Thread Miller equipped with a taper attachment. It's a simple, positive way to produce accurate taper threads . . . a job that would be difficult without this equipment. The "secret" is in that positive, smoothly working taper attachment . . . an easily adjusted path for the follower block that moves the cutter in or out. The machine does its regular job of milling a precision thread, and the attachment guides the cutter along the desired taper.

Pratt & Whitney can supply thread milling equipment capable of producing accurate milled threads ranging from ¼" O. D. and very fine pitches up to the equivalent of a standard 2½" circular pitch worm thread. If you need accurate threads, find out about these machines. A letter will bring you the information.

PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD 1, CONNECTICUT

Assembly Line . . . .

STANLEY H. BRAMS

• OPA, CIO cause some industry misgivings, but schedules still hold . . . Kaiser-Frazer want Willow Run . . . Materials situation clears.

DETROIT—The automobile industry was bedded down last week, transiently troubled over a few details, but benignly certain that a full delivery of cars would be made on schedule.

Some misgivings came with a gumshoe visit to individual producers of OPA representatives bearing the new pricing formula. The OPA-ers said nothing while in town; the press whispered in double banner speculative headlines. The companies, recalling the difficulty the public had in understanding the workings of something as comparatively simple as the atomic bomb, wisely left the explanation of the pricing formula up to Chester Bowles, OPA administrator.

Premonitory labor pains were provided by the CIO United Auto Workers. A sharp twinge came when Walter P. Reuther, head of the union's General Motors department and self-appointed counselor to the industry on assorted matters, served notice on GM for a 30 pct wage increase for 300,000 workers. Reuther felt the corporation was well able to pony up the raise without boosting prices, thus conforming to government stabilization policy. His goal was to maintain take-home-pay, which he said had been reduced 30 pct by reduction to a 40 hr week. Tossed in was a suggestion, which no doubt will be studiously ignored, that General Motors call an industry-wide conference to negotiate the increase on an industry basis. This would allow the union to blend all its contract eggs into an omelet instead of heating the pan for each company separately. Individual pans were being heated, however. Demands for the 30 pct boost also are being served on Chrysler and Ford, with the pullet sized manufacturers due to follow.

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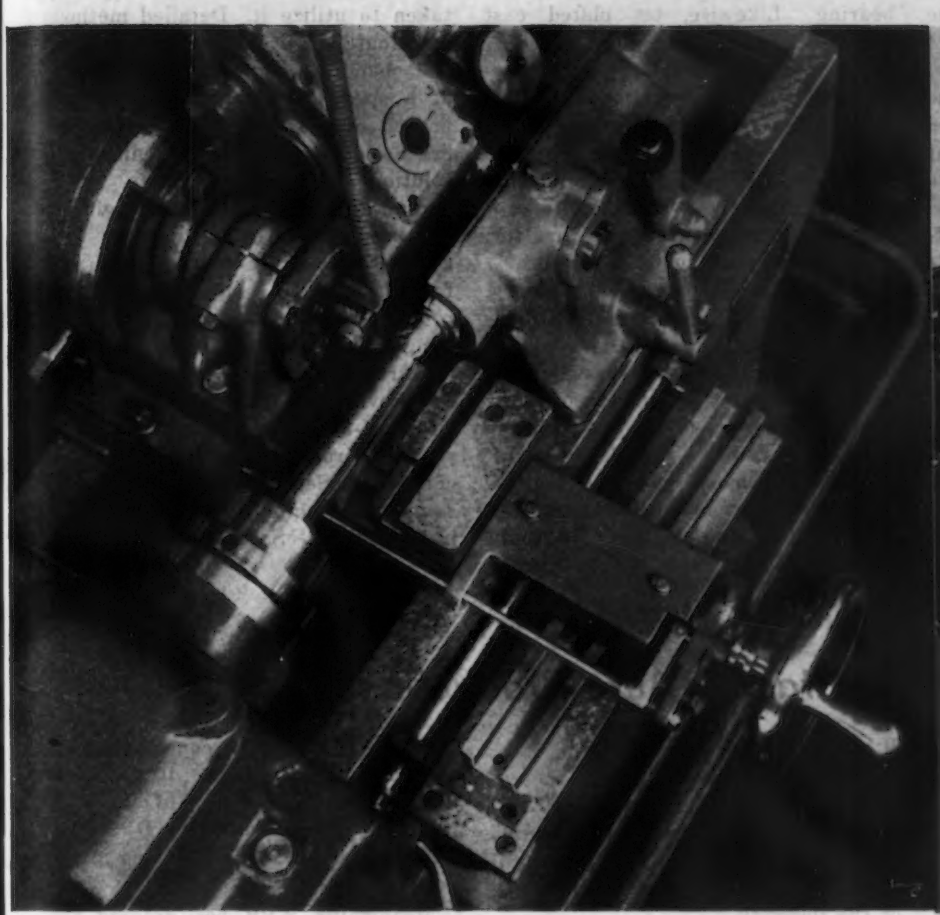

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uncustomary for new makes, its requirements would be insufficient alone to warrant new facilities for several of the more complicated components. In the Midwest several sources of supply are available, and these undoubtedly will be called on for the time being.

CONTRACT cancellations for the industry as a whole have passed from the realm of production to that of termination settlement. Only a few war production islands stand in the way of straight line automobile output. The machine tool and materials barriers appear much less formidable than a month ago.

Delivery promises on new machine tools have improved to such an extent that unless government disposal agencies step briskly they will have difficulty in marketing surplus used tools for which buyers were clamoring a month ago. The critical tools listings service of the Automotive Council for War Production reports that calls on it for used equipment already have decreased materially, and that most requests can be filled readily. The phenomenon of the past week has been the surge of offerings of new standard tools by manufacturers whose military contracts have been cancelled. Even presses, long a bottleneck, are beginning to appear in some quantity. Few new Rube Goldberg special machines will appear when the automobile lines start up, but those used in 1942 have been carefully preserved. Deliveries promised on new special equipment have moved forward with alacrity.

Detroit tool and die shops, jammed with war work a fortnight ago, now are threatened with overcapacity for automotive needs. The coast is clear here.

EVEN materials lumps in the production craw gradually are dissolving. Revocation of the Controlled Materials Plan, effective Sept. 30, allows steel mills to slip automotive requirements into mill schedules ahead of previous orders, and there is good evidence that the steel Barkuses are willing. Lumber spewed forth from all quarters with cancellation of war contracts. Textiles, as predicted in this column as long ago as May, seem to be coming in sufficient quantities for the production fabric.

Tin and chrome will cause more inconvenience than difficulty. WPB remains adamant on its refusal to allow tin in body solder, and this matter is not entirely resolved. Experimental work leans to a tinless antimony solder or a 4 pct tin solder, in the hope this concession can be secured. Bearing types are being changed to eliminate sweating-in of rod bearings with tin. Ford has a tri-alloy tinless bearing. Likewise, tin plated cast iron or cast steel pistons probably will be out for at least the initial production stages. Ford, whose 1942 models had cast steel pistons plated with tin or cadmium according to availability, is using aluminum pistons. Pontiac, not yet ready to produce, still is debating the matter. Chevrolet is sticking to cast iron.

Despite rumors to the contrary, brightwork will shine in full brilliance. Several expedients have been proposed to provide the equivalent of at least part of the 25,000 lb of chromium estimated to be needed in plating solutions for the first 200,000 cars. Possibly the most ingenious suggestion has been advanced by W. M. Phillips of General Motors. He would literally rescue the needed chrome from the sewers. His reasoning is that with the completion of war contracts there must be a large gallonage of spent anodizing solutions and used chromic acid which probably will go down the drain unless steps are taken to utilize it. Detailed methods were outlined by him and a commercial chemical company representative at a special meeting of the Detroit branch of the American Electroplaters Society by which spent anodizing solution may be purified to secure chromic acid; or after spent solution has been concentrated, together with a small amount of new chromic acid for plating. He estimates that approximately 50,000 gal of used anodizing solution would be required for the first 200,000 cars.

A revision to Schedule 62 of WPB Order M-300 will permit free use of surplus chromic acid, and a scheduled change in September would free to some extent shipment of chromic acid by producers. So the grillwork still shines.

o o o

Quotas on Auto Production Lifted

Washington

• • • Production ceilings on passenger cars were removed by WPB on Aug. 24, thereby permitting unlimited production, subject only to the availability of materials and the capacity of the industry.

However, the new cars cannot be equipped with spare tires at the present time. WPB said that the complete revocation of order L-2-G which prohibited the production of passenger cars, except as authorized under the quota system, has been held up pending a decision on the continuation of the ban on spare tires. It has been decided that the control of the fifth tire will be handled by the OPA. Action by that agency is expected in the near future.

Meanwhile, WPB has ordered the amendment of L-2-G deleting the limitation on production but retaining the paragraph pertaining to ties. The removal of restrictions also applies to the production of commercial vehicles such as taxicabs, ambulances, and hearses.

o o o

Micromatic Hone Buys Surplus Plant

Washington

• • • The sale of a Government-owned plant which, upon reconversion to peacetime production, is expected to provide more jobs than were available while the plant was working on war contracts, was announced today by the Detroit Agency of the Reconstruction Finance Corp.

The sale was made to the Micromatic Hone Corp. in Detroit and consists of land and buildings and a portion of the machinery and equipment installed in the plant for war work. The property had been leased from RFC by the Micromatic Hone Corp. for war use. The corporation manufactures abrading machine tools and honing accessory equipment.

Information supplied by the corporation to RFC shows that in 1940 the company employed an average of about 400 persons. While engaged in war work, its payroll was about 1000. In postwar work it is believed that jobs will be provided for 1200 or more persons.

The offer of the Micromatic Hone Corp. was the only one received by RFC for the property.

How To Make Your Tools & Dies Produce EXTRA Pieces On Each Job...

Getting tools and dies that produce more pieces on each set-up isn't a matter of luck. Here's a practical way to get *extra output* from each tool by reducing machine down time. Use this 3-step *job analysis* plan to save money in tool making, heat treating and all along the production line.

1. Plan Tool Performance At The Start

Here is a tried and proved way to get the extra output you want from your tools. With the Carpenter Matched Set Method you can actually plan tool performance before tools are made. For example, when you need greater toughness or more wear resistance in a tool, the Matched Set Diagram points to the tool steel best suited for the job. To cash in on its advantages ask for the 167-page Matched Tool Steel Manual. Its handy index quickly shows the way to the proper tool steel to meet your needs. For your free copy, drop us a note on your company letterhead.

2. Follow Up With Heat Treating "Know-How"

You know that proper heat treatment will back up your work in making tools that stay on the job. And here is how Carpenter can help you get better heat treating results. The Carpenter Heat Treating Guide provides complete, correct heat treating information in easy-to-use form. It gives you forging and normalizing heats, annealing and hardening treatments, recommended drawing ranges for all of the Matched Tool Steels. It gives tips on quenching, drawing and furnace atmospheres. For tools that will stay on the job longer and produce extra pieces, ask for your free Heat Treating Guide.

3. Check Each Tool's Output On The Job

How many pieces does it produce between grinds? Did it fail too soon in service? Answers to those questions give you a yardstick to use in boosting output from each tool. Start today to check tool and die performance for more output, lower costs. And whenever you want personal help with a tooling problem, call your nearby Carpenter representative. He'll be glad to work with you.

The Carpenter Steel Company
121 W. Bern St., Reading, Penna.

Carpenter
MATCHED
TOOL STEELS

Washington . . . L. W. MOFFETT

• Tin shortage dictating withdrawals from stockpiles . . . Full employment bill calls for new PWA . . . Is at top of legislative calendar.

WASHINGTON — Reconversion tin needs make it imperative that the armed services and the Office of War Mobilization and Reconversion reach an early decision on the release of at least a portion of the frozen stockpile accumulated for war uses.

Acknowledged to be the tightest spot in the post V-J Day materials picture, the tin supply situation needs to be improved if serious reconversion bottlenecks are to be avoided. Where substitutes cannot be used, the only alternatives are to make every effort in getting needed quantities from our largest prewar sources —Malaya and the Dutch East Indies —or to dole out from frozen stockpiles minimum needs to break possible bottlenecks.

WPB has estimated that around 68,000 tons will be available during the next six months, over and above existing stockpiles, although the actual amount may be less. With industrial needs expected to approximate 100,000 tons, prospects are that there will be a deficit of between 28,000 tons and 32,000 tons. This deficit, it is believed, could be mitigated at least in part by earmarking for emergency allocation a portion of the estimated 59,000 tons frozen stockpile of contained metal and concentrates. This quantity is over and above the amount that will be released to industry. In any event, this procedure would serve the useful purpose of getting us "over the hump" until additional tin can be made available from Pacific sources. However, WPB thinking seems to be that the stockpile must remain intact until imports are forthcoming.

Action has reportedly been taken by the WPB and FEA to set the stage for early resumption of tin production in the Pacific area. Although the condition of tin mines in the area is not yet known and the extent of damage incurred during Japanese occupation is yet to be determined, those agencies are trying to work out a plan whereby the British and Dutch interests will be in a position to secure the needed equipment from American sources when the tin producers are ready to go ahead.

There may, however, be a problem of time lag before the heavy equipment needed for resumption of production can be manufactured and exported. For example, heavy duty dredges may require from one to two years' construction time after orders are placed. The cost of these dredges has been estimated at upwards of $1,500,000 each.

It is expected that the purchase of needed equipment will be on a cash-and-carry basis. According to a spokesman for the FEA, there are presently no negotiations underway for loans to rehabilitate tin producing facilities, either through the Export-Import Bank or other government lending agencies.

* * *

UNEMPLOYMENT compensation and full employment appear as the leading contenders for the number one spot on the calendar when Congress convenes, as scheduled, on Sept. 4.

Meanwhile, Congressional Committees have heard numerous witnesses on this important reconversion legislation. The Murray-Wagner Full Employment bill provides that when private enterprise is deemed unable to provide full employment, government shall step in and through the medium of a public works program stimulate the economy by providing jobs for those who would otherwise be unemployed.

The unemployment compensation bill which was introduced by Sen. Harley M. Kilgore, Dem., W. Va., provides for an increase in unemployment compensation to a maximum of $25 a week for 26 weeks, where necessary, during the emergency readjustment period. Hearings on this bill will begin August 29.

Although President Truman has urged that action be taken first on the full employment bill, opinion on Capitol Hill seems to be that the unemployment compensation measure may be the first on the agenda.

Witnesses testifying before the Senate Banking and Currency Committee have, practically without exception, endorsed the full employment bill in principle. The general tone of their remarks, however, seems to indicate that there may be considerable groping for an instrumentality or mechanism to put the plan into actual operation.

Secretary of State James F. Byrnes in a prepared statement delivered before the Senate Banking and Currency Committee on Aug. 21 linked the necessity for a full employment bill to the world situation generally. "A domestic program maintaining employment is an essential part of international cooperation in the pursuit of peace and prosperity," he said.

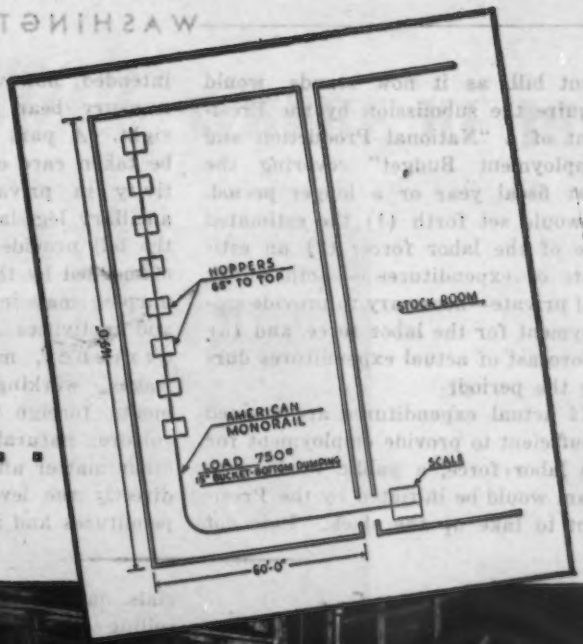
The statement emphasized the importance of full production and employment in the United States as a means of stimulating international trade. The secretary intimated, however, that he had examined the bill only superficially and had not made a careful study of the provisions.

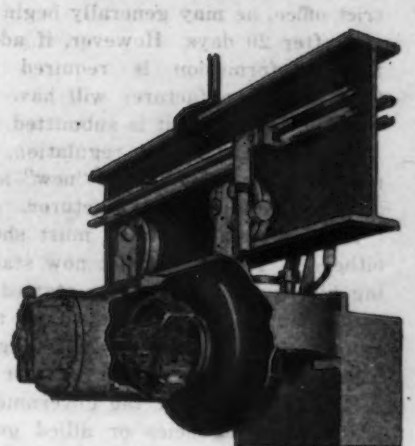
The part any full employment bill will play in our postwar economy can be best grasped through an understanding of the theory behind it. In brief, the effectiveness of the bill can probably be measured by the amount of capital expenditures which, according to its sponsors, represents the dynamic force behind full employment and prosperity in the days to come.

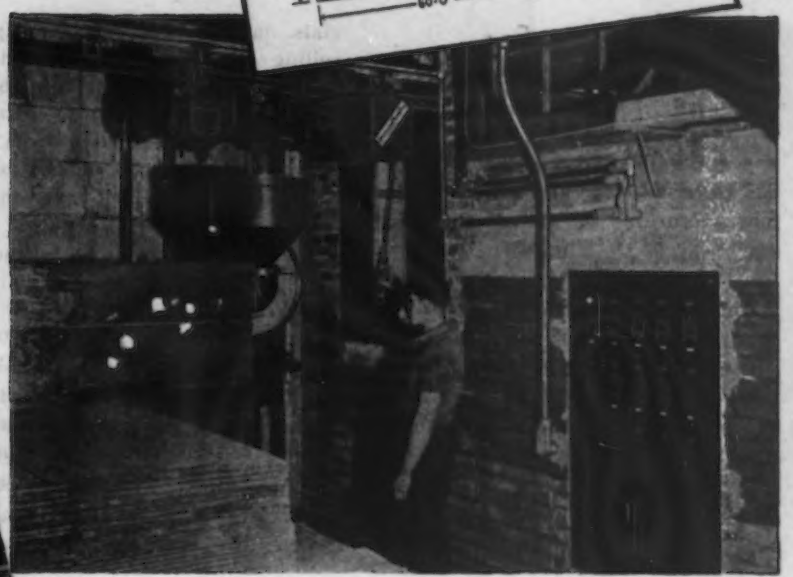
The form of administrative organization required to set into motion the provisions of the bill in all likelihood will resemble the Public Works Administration. It will have little if any bearing on the war agency setup War controls are almost wholly incompatible with a plan for long-range, peacetime employment.

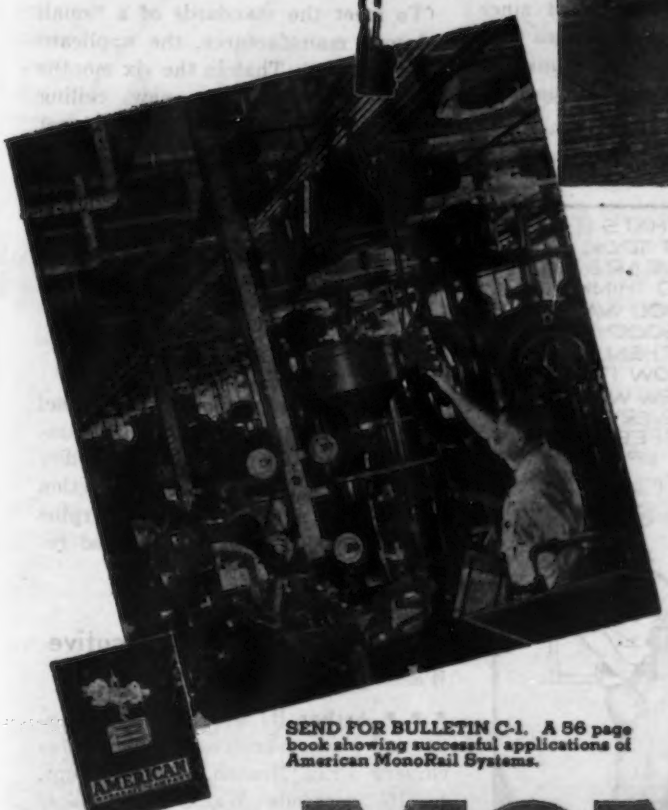
The mechanics of the full employ-

American Mono Tractor *Automatically* Feeds 15 Stations . . . . .









HERE is an American Mono-Rail System that is almost human. By remote control, semi-precious metal is delivered to fifteen tube-forming machines.

After dispatcher fills container with slugs he carefully check-weighs the load and dispatches it to one of the 15 machines. Operator at machine where carrier stops automatically unloads the metal slugs by push-button control and returns carrier to central station. All handling operations are performed through signal lights and push-button switches. American MonoRail Systems are not all so complicated. But all do the handling job for which they are designed — better, quicker and at great saving in cost. An American MonoRail engineer will gladly tell you how it will work in your plant.

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THE AMERICAN MONORAIL COMPANY

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ment bill, as it now stands, would require the submission by the President of a "National Production and Employment Budget" covering the next fiscal year or a longer period. It would set forth (1) the estimated size of the labor force, (2) an estimate of expenditures — both public and private—necessary to provide employment for the labor force, and (3) a forecast of actual expenditures during the period.

If actual expenditures are deemed insufficient to provide employment for the labor force, a public works program would be initiated by the President to take up the slack. It is not intended, however, that the Federal treasury bear the entire load outright. A part of the burden would be taken care of by stepping up activity in private business through ancillary legislation. The portion of the bill provides that programs recommended by the Executive for such purpose may include federal policies and activities concerning banking, currency, monopoly, competition, wages, working conditions, investments, foreign trade, taxation, agriculture, natural resources and any other matter affecting directly or indirectly the level of non-federal expenditures and investments.

Special Pricing For Some Firms Described

Washington

• • • **Details of special** pricing methods to be used by new, small volume manufacturers of most consumer goods except clothing were announced by OPA Aug. 27.

The new procedures which were set up by Order No. 4332 under MPR 188, effective Sept. 5, provide alternative methods for computing price ceilings.

Under the first option designated as the "cost method," the applicant will total estimated costs, including materials, labor, other factory expenses, selling and administrative costs, and add the profit factor furnished by OPA. This factor, it was explained, represents the full peacetime profit margin of the particular industry. After a period of 90 days, the new manufacturer will be required to recompute his ceiling prices on the basis of actual costs rather than estimates. These original ceiling prices expire automatically five months after the items go into production, OPA said.

If price ceilings established since Sept. 1, 1944, for manufacturers covered by this regulation prove unsatisfactory, this method may be used to recalculate such ceilings. In these cases, OPA explained, latest cost figures will be required if the concern has been in production 90 days.

As an alternative, a new manufacturer may follow the "in line" method by adopting the ceiling price on a comparable article already on the market. Adjustments may be made from such ceiling prices, OPA said, to compensate for material differences in cost of production between the two articles.

After a manufacturer submits proposed price ceilings to the OPA district office, he may generally begin to sell after 20 days. However, if additional information is required by OPA, the manufacturer will have to wait 20 days after it is submitted.

To qualify under the regulation, an applicant must be both a "new" and a "small volume" manufacturer.

A "new" manufacturer must show either—1. That he is just now starting his business or that he started it after Sept. 1, 1944, or—2. That the entire output of any business engaged in before that date was on contract or subcontract work for the government procurement agencies or allied governments.

To meet the standards of a "small volume" manufacturer, the applicant must show—1. That in the six months before reporting the new ceiling prices under this order, his total net sales to civilians amounted to $100,000 or less and—2. That he does not expect civilian sales within six months after filing his prices to exceed $100,000.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

Aircraft Head Named

Washington

• • • **The appointment** of Colonel Frank J. Murphy of Boston, Massachusetts, as associate director, Office of Surplus Property, Reconstruction Finance Corp., in charge of surplus aircraft disposal, was announced recently by RFC.

A. H. Moran Is Price Executive

Washington

• • • **Arthur H. Moran** has been appointed price executive of OPA's Machinery Price Branch, effective Sept. 1. He succeeds Walter Shoemaker who has resigned to join Dravo-Doyle Co., Pittsburgh.

Mr. Moran joined OPA in 1941 and at present is head of the General and Auxiliary Equipment Section of the Machinery Price Branch.

HE *Doesn't know* WHERE HE IS!

He doesn't know where he is—and he doesn't care. He was given just a job to do. "Run so many pieces" the boss said—"We'll check 'em later!" So the operator went to work—in the dark—without knowing "where he was." What if something did get out of adjustment or the tools wear faster than they were supposed to. He should worry—the bad parts wouldn't show up till the job was done.

But suppose the boss had said, "Joe, run so many of this. It's got to be a good job—hold it close. And here's a gage to show you where you are. Check every piece. If anything gets out'a line, call me—*don't run scrap!*"

Here was a real job—a responsibility. It was up to Joe to make GOOD parts —and not make any scrap. The job was tough—he had to hold it close. But Joe did it—and he was proud of it. He knew "where he was" because he checked each part right at the machine with his Sheffield indicating gage. The gage told him whether the machine was going out of adjustment—when the tools were getting dull—and if he was doing anything wrong.

If your jobs are tough—and scrap is piling up—because your operators are "working in the dark", CHEK WITH SHEFFIELD.

Write for Engineering Data or a demonstration in your plant of Sheffield Visual Gages • Precisionaires • Airsnaps • Electrigages • Dial Indicator Snaps and Thread Checking Instruments. "THERE'S A SHEFFIELD INSTRUMENT FOR EVERY GAGING APPLICATION."

THE SHEFFIELD CORPORATION

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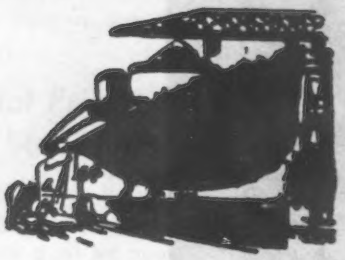
MACHINE TOOLS • GAGES • MEASURING INSTRUMENTS • CONTRACT SERVICES

SHEFFIELD MASTER CRAFTSMEN

West Coast . . .

OSGOOD MURDOCK

• Independent steel buyers threaten to boycott eastern steel interests and local mills that block lower differential . . . Kaiser claims RFC loan adjustment forces his operation at prewar price structure.



LOS ANGELES — "Expansion of western industry is impossible at the steel prices proposed by the RFC," declared Kenneth Norris, president of the Norris Stamping Co. and chairman of the steel committee of the Western States Council, at a reconversion conference here last week. Mr. Norris is reported to have suggested boycotting eastern steel interests and local mills that are "blocking the West from breaking the steel differential."

As western industrialists met with Governor Warren, other members present expressed a like degree of shock at the terms of the RFC readjustment of the Kaiser obligations on the Fontana steel mill as reported in THE IRON AGE, Aug. 23, 1945, p. 109. Alden Roach, president of Consolidated Steel Corp., said "The West is being garrotted," and Governor Warren, astounded at RFC's effort to recapture 100 cents on the dollar, has ordered a state investigation.

The Kaiser companies, although not yet officially notified of the resolution of the RFC board of governors, issued a statement commenting on the RFC press release outlining the terms of refinancing.

"We have been assured that the resolution would represent the best proposal within the power of the RFC," the statement said. "We shall explore every possibility to find in the resolution terms with which we can comply—regardless of whether it is fair or unfair. There is more at issue here than our interest in Fontana.

"It is declared in the release that Fontana, after it is equipped with the $11,500,000 steel finishing facilities recommended by RFC's consulting engineers, will earn sufficient income to carry the fixed charges on its capital debt." (Set at some $114,000,000 in the terms of the RFC resolution.) "These calculations are based on the assumption that Fontana will market steel at the full limit of the differential price which prevails on the Coast—contrary to the hope of the West that the differential might be reduced.

"These adjustments require that Fontana carry a first mortgage of $69,500,000, representing what RFC declares to be the actual sound value of the present plant plus the newly authorized facilities. This factors out as a bonded debt of $92.56 per ton of ingot capacity at Fontana—nearly 12 times the average $7.60 per ton debt of the steel industry. In order to service and amortize this mortgage, Fontana must earn fixed charges of more than $7.00 per ton of ingot capacity or twice the total per ton earnings of the steel industry.

"On top of this Fontana is to assume further obligations to pay the RFC $44,000,000. This sum apparently represents excess costs above sound value, and must, therefore, include the war costs incurred by Fontana's record construction.

"Total fees from the three Kaiser shipyards, amounting to something less than $40,000,000 are to be applied to the debt. We are expected to pay and write off not only Fontana's war costs but $4,000,000 more on the RFC's estimates, and $35,000,000 more on estimates of Fontana's war costs made by consulting engineers retained by Kaiser Co., Inc. This excess war cost figured by H. A. Brassert & Co. is $73,600,000.

"In order to earn the high fixed charges required to service the burden of wartime construction, Fontana will be forced to operate at the full prewar price differential created by East-West freight costs and the West will be disbarred from the benefits of sound economic costs of steel production from the West's own resources."

Eliminating the controversial Mr. Kaiser from the argument for the moment, many heretofore neutral observers are beginning to agree with the contentions in the statement. Western business is inclined to assume that the same formula will ultimately apply to the sale or lease price of Geneva. On this basis the asking figure for the latter plant on the basis of bonded debt alone comes to $129,000,000. These two figures set up a bonded debt for the two western steel plants of $198,500,000 requiring, at RFC rates, of 8 pct, almost $1,600,000 in annual carrying charges alone.

Kaiser interests claim that Fontana construction costs amounted to less than those for Geneva citing costs of $126 per ingot ton of capacity for their plant against $195 for Geneva. Steel men assume that somewhere near the same ratio of secondary liens will also apply to Geneva when it goes on the block. According to the total $114,000,000 capitalization for Fontana, Geneva's would then approximate $215,000,000, making a grand—to put it mildly—total of $329,000,000 capitalization for the two steel plants.

Quite aside from the possibility of some mild competition for business and resultant curtailed profits when Coast manufacturing plants get down to business, where, businessmen ask, does that leave the West?

Some industry members raise the question of Kaiser's applying the $40 million shipbuilding fees to the purchase of Fontana and say he is getting it with rubber dollars. Kaiser people maintain that their three yards showed the lowest shipbuilding costs in the country and that the $40,000,000 is a legitimate figure arrived at after taxes and all charges, representing a fair profit on some 800 vessels. They further ask if other possible steel plant buyers haven't been enjoying some of the same fruits themselves.

Conservative steel men frankly wonder how the RFC expects to appraise Geneva on a salable basis if it has already committed itself to the Fontana formula. It doesn't require a lightning calculator—anyone with a pencil can take the 60 pct production rate from the McKee report, a 70 pct ingot-to-finished-steel ratio and figure the 60 pct of 70 pct of probable postwar consumption of finished steel products and see that there is not a sufficient market, even throwing in Texas to boot.

Neutral observers discount Mr. Kaiser's reference to the $7.60 aver-

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In the vital power links so essential to the efficient performance of modern industrial epuipment . . . in the friction clutches and hydraulic drives which link driving and driven units . . . there, too, it's always time for precision—precision in design, construction and application.

For 27 years now, Twin Disc has made a point of putting precision before production . . . quality before quantity. That's why Twin Disc Clutches and Hydraulic Drives are recognized as *proved power links* . . . that's why Twin Disc products are found in so many makes of powered equipment and machinery.

If you have a problem of power transmission and control, why not follow the lead of the many equipment builders and users who have found the solution in the Twin Disc trade mark? Why not ask the recommendations of the Twin Disc engineers today? Write the TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).

SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918

age bonded indebtedness for the industry. They know that he expects no such hand-out as that. They are confused, however, by reports that he previously asked a group from the Western States Steel Council to endorse a proposal which he intended to make to the RFC involving a total price for Fontana exceeding the amount to which he is now taking exception.

Mr. Kaiser's contemplated financing plan is reported to have called for a total capitalization of $176,000,000. This was to have been divided $35,000,000 class A stock, $54,000,000 class B (not a note) to be held by the government, and the balance to be a mortgage for $87 million.

At the informal meeting at which this proposition is said to have been put forth, Mr. Kaiser is understood to have said that it was his cherished ambition to repay to the government every cent which he owed. Tempering their admiration for his high ideals, members are said to have raised the emphatic issue of the disservice to the people which the precedent of repaying excessive war costs to the government might set.

Western States Council members set forth four requisites for potential war plant negotiators: The bidder must know steel; know the value of the steel plant; be financially competent; that the government obtain two or more bids for the plant in order to obtain the highest equitable recovery.

On the proposed capitalization of the informal Kaiser proposal, Fontana was said to be able to earn some $9,000,000 at 80 pct of capacity. This figure, however, might have been before taxes and other charges, and it was not made clear at what steel price the conclusion was based.

In spite of the growing belief among business men that behind the scenes maneuvering by interested parties is reaching a high point, dispassionate critics feel that the Fontana mill is making a good record under handicaps. Kaiser officials won't disclose their costs but reliable sources report that Geneva ingot costs run $26 to $27 a ton and that Fontana's run $25 to $26 which comes as a surprise to many industry members. Kaiser officials claim that delivered costs of materials at their mill run several cents lower than delivered costs at Chicago, and that despite Geneva's lower ore and coal costs, if outsiders admit that Fontana is making lower cost pig than Geneva then they aren't doing so badly.

Steel men say that the true evaluation of Kaiser costs don't start with pig, but at the cutting table where Geneva's costs drop way below Fontana's. Kaiser men, however, hasten to remind the world that rolling equipment made available to eastern mills was "withheld from Fontana." They are quite heated in maintaining that if they had been able to get Mesta or National rolls their rolling costs would have been considerably reduced. They add that for $1½ millions they will be reduced now that the equipment becomes available.

TO clarify—or to further confuse—the issue, western steel men say that Fontana's type of mill is worth between $80 and $90 per ton of ingot capacity. And on this basis the funded debt for Fontana would be between $60,000,000 and $67,500,000, and on Geneva it would run from $102,400,000 to $115,200,000. Industry members quote the circus barker and say, "You steps right up and you takes your choice."

Coming more and more strongly to conclusion that pressure politics will exert strong influence in eventual disposition of the two western mills, steel men are waiting for the next move. They feel that U. S. Steel was checked, as the chess players say, but that Mr. Kaiser is now in check for the moment. They say that the next move is up to the government and it will be interesting to see if the formula for the Fontana loan readjustment will apply to Geneva, the Houston plant being operated by American Rolling Mill, the Republic Steel plant at South Chicago and the Homestead plant at Carnegie, Ill., which uses a common fence with its neighbor.

* * *

After a 10-day shutdown Geneva went back to work Monday, Aug. 27, operating one blast furnace, three open hearths, and working five single turns a week. The plate mill is booked for the next six weeks. Company officials say that they will keep on making plates for anyone who wants them, but . . .

* * *

As the Mead Senate sub-committee arrived in Seattle an unverified report bruited about that Alcoa has made an offer to DPC "for those aluminum plants which show some economic justification." Terms of the offer are said to be a lease for a period of three, four or five years. The lessee is to pay operating costs with his own capital, pay taxes, insurance, etc., out of profits. The government is to be paid cash representing normal depreciation and share in the profits, the government to stand all losses in the operation. And it is reported that Sam Husbands, head of DPC, does not look with disfavor on the proposal. At the same time, the Kaiser interests are reported preparing to open negotiations for the same light metals facilities.

o o o

Rheem to Operate At Least 12 Plants

New York

• • • **Substantially all of Rheem Mfg. Co.'s military orders for steel shipping containers are to continue for the balance of the year, according to R. S. Rheem, president. Restrictions now having been lifted, Rheem has also begun to supply tremendous backed up commercial demands for steel shipping containers.**

Rheem will also continue, on a reduced basis, manufacturing power plant assemblies and other parts for Consolidated-Vultee and Ryan Aeronautical. A Stockton plant will recondition steel drums for the military until the end of the year.

With the exception of the continuation of a Navy gun design and development contract, and a several months' contract to manufacture 5-in. Navy cartridge cases, all other ordnance and ammunition contracts have been terminated.

Ammunition contracts at Danville and Williamsport, Pa., and Las Vegas, Nev., which plants have been operated under lease, have been terminated. Remaining aircraft work at the leased plant at Maywood, Calif., will be moved to South Gate.

By the end of the year the Rheem Co. plans to operate in the United States, not less than twelve plants—Richmond, South Gate and Stockton, Calif.; Portland, Oregon; Salt Lake City, Utah; Houston, Texas; New Orleans, La.; Birmingham, Ala.; Sparrows Point, Md.; Bayonne, N. J.; and two plants in Chicago, Ill. Steel shipping containers will continue to be manufactured at eight plants and household utility appliances will be built at nine of the plants.

MORE ACCURATE

HYDRAULIC PRESSURE CONTROL

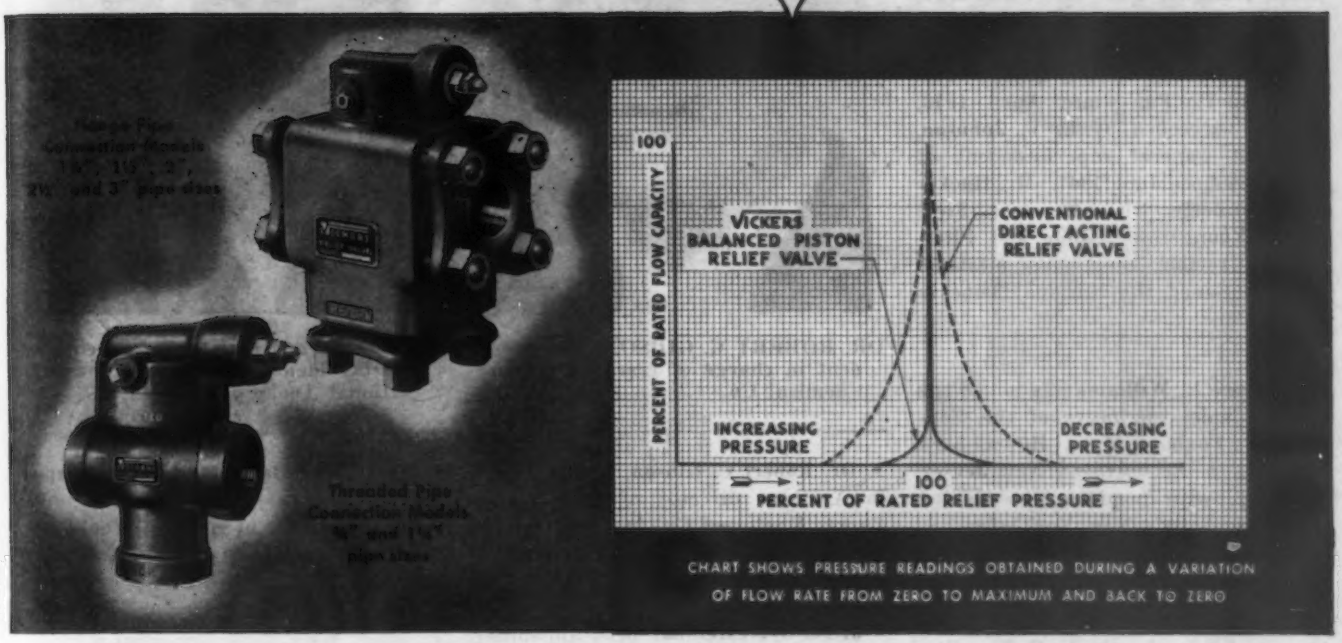

CHART SHOWS PRESSURE READINGS OBTAINED DURING A VARIATION OF FLOW RATE FROM ZERO TO MAXIMUM AND BACK TO ZERO

VICKERS

Balanced Piston Type

RELIEF VALVES

As indicated by the chart above, Vickers Balanced Piston Type Relief Valves have a negligible pressure variation throughout their capacity range. In these valves a hydraulically loaded and balanced piston takes the place of the customary spring-loaded direct-acting relief mechanism. This means more sensitive operation as well as greater accuracy throughout the wide pressure range.

This accuracy of control prevents pressure override when sudden changes in pressure occur in the hydraulic system. Compact design, longer operating life, installation directly in the pressure line, quiet operation, and simple adjustment are other advantages of these Vickers Balanced Piston Relief Valves. See Bulletin 38-3 for complete information.

Vickers Application Engineers will gladly discuss with you how Vickers Hydromotive Controls can be used to your advantage.

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PERSONALS

DR. ROBERT C. GIBSON, vice-president in charge of research, Tanner Chemical Co.

HARRY W. BARKLEY, executive vice-president and general manager, National Tool Co.

• **J. W. Hacker** has been appointed executive assistant, operating department, National Tube Co., Pittsburgh, a U. S. Steel subsidiary. Mr. Hacker, who has been general superintendent of the company's Christy Park Works, McKeesport, Pa., since April 1943, will be succeeded by **L. V. Johnson**, assistant general superintendent of the plant since June 1941. Mr. Hacker was formerly with Republic Steel Corp., Youngstown, Ohio, and Pittsburgh Crucible Steel Co., Midland, Pa. He joined the National Tube in 1940.

• **Clarence L. Williams** has joined the staff of sales engineers of the Foxboro Co., Foxboro, Mass. He has been assigned to the northern New Jersey territory, with headquarters located in the company's New York office.

• **M. A. MacConnel** has been appointed Detroit district manager in charge of sales for the U. S. Tire Div. of U. S. Rubber Co. He has been associated with the company since 1929, most recently handling government tire sales for the Detroit Ordnance District.

• **C. C. Anderson** has been appointed assistant district manager, the Goodyear Tire & Rubber Co. at Los Angeles.

• **Charles W. Anklam**, general manager of the C. M. Hall Lamp Co., Detroit, has been appointed executive assistant to Albert B. Hartz, president.

• **A. L. Meyer** has been appointed assistant eastern manager of sales, Great Lakes Steel Corp., Detroit, representing the company in the Philadelphia and New York areas. Since January 1942, he has been associated with the War Production Board, most recently as chief of the Plate Section, Steel Division.

• **Taylor H. Beech** has been appointed representative of Ajax Electric Co., Philadelphia. Mr. Beech will serve the Pittsburgh area, including western Pennsylvania, eastern Ohio and West Virginia.

• **Dr. Robert C. Gibson**, who resigned in April as director of research at Parker Rustproof Co., has been named vice-president in charge of research, Tanner Chemical Co., Detroit.

• **J. M. Sylvester** has been appointed general manager of the Bethlehem, Pa., plant of Bethlehem Steel Co., succeeding **R. A. Lewis** who is retiring as general manager. Mr. Lewis will continue in a consulting and advisory capacity. **A. D. Shankland**, engineer of tests, will succeed Mr. Sylvester as assistant general manager. Mr. Sylvester was formerly superintendent of the Lehigh Div. of the company.

J. M. SYLVESTER, general manager, Bethlehem plant, Bethlehem Steel Co.

• **Harry W. Barkley** has been appointed executive vice-president and general manager of National Tool Co., Cleveland. Before joining National Tool, Mr. Barkley had been connected with the Ford Motor Co. for 27 years.

• **Adolph G. Hochbaum** has been named managing director for exports to U.S.S.R. and general sales representative for Central and Eastern European countries for the Baldwin Locomotive Works, Eddystone, Pa. He has been with Baldwin since Jan. 1, 1939, handling various products for Russia.

• **O. A. Tucker** has been appointed vice-president and general manager, Everett Pacific Shipbuilding & Dry Dock Co., Everett, Wash. He was formerly with Pacific Iron & Steel Co., Tacoma, Wash., where he was president and general manager. **James N. Cunningham** has been made works manager of the Everett plant.

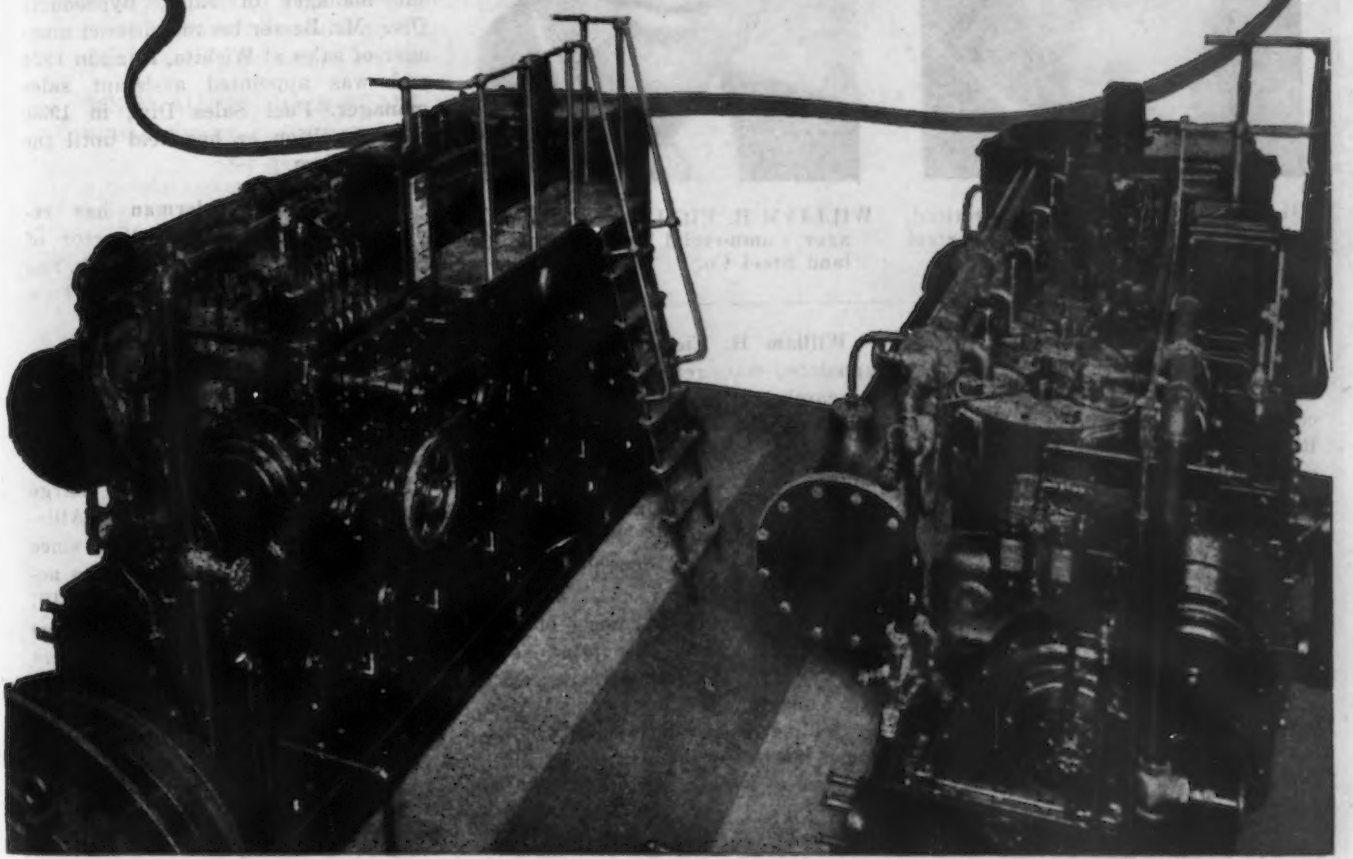
• **William C. Dickerman, Jr.**, has been elected vice-president in charge of engineering and manufacturing of the Milton Mfg. Co., Milton, Pa.

• **Col. Ralph L. Hart**, until recently director, Procurement Div., Procurement and Distribution Service, Office of Chief Signal Officer in Washington, has returned to the Western Electric Co.'s New York headquarters as distribution manager of the telephone sales division.

Fairbanks-Morse Diesels

Score $10,000 Saving

for Textile Mill



For years the big Bourne Mills of Fall River, Mass., operated a steam plant for two-thirds of their power needs and bought the remainder at an annual cost of $36,000 to $40,000.

Then two 500-hp. Fairbanks-Morse Diesels were installed. These two heavy-duty Diesels are now producing power for less than eight-tenths of a cent per kw-h.

At this rate the annual saving on all costs for operation and maintenance is almost exactly $10,000.

A Fairbanks-Morse engineer will tell you how much Diesel power can save in your plant. Write Fairbanks, Morse & Co., Fairbanks-Morse Building, Chicago 5, Ill.

Fairbanks-Morse

A name worth remembering

Diesel Locomotives • Diesel Engines • Generators • Motors • Pumps • Scales
Magnetos • Stokers • Railroad Motor Cars and Standpipes • Farm Equipment

CHARLES H. RHODES, retired, Chicago vice-president, U. S. Steel Corp. of Delaware.

WILLIAM H. EICHENGREEN, manager, Commercial Research Div., Inland Steel Co.

• **Charles H. Rhodes** has retired as Chicago vice-president of U. S. Steel Corp. of Delaware, after reaching the corporation's retirement age. Mr. Rhodes has been associated with the corporation and subsidiary companies in various capacities since his initial employment with the American Steel & Wire Co. in May, 1899.

• **Tye M. Lett, Jr.**, formerly of General Motors Overseas Operations, New York, has been appointed assistant director of exports, the Crosley Corp., Cincinnati. Mr. Lett has maintained offices in India, China and various Latin-American countries.

• **Otto F. Seidenbecker**, formerly vice-president of the Wisconsin Steel Co., has become associated with the Chicago Steel Service Co., as assistant to Walter D. Monroe, president. Mr. Seidenbecker will be located in the company's recently opened Chicago office.

• **R. W. McLaughlin** has joined Carrier Corp., Syracuse, N. Y., as assistant director of development in charge of the heavy machinery engineering section.

• **Maurice C. Taylor**, formerly manager of research at the Niagara Falls Laboratories of the Mathieson Alkali Works, has been appointed resident director of research and development. **J. Douglas MacMahon** has been named assistant to the technical director; **C. N. Richardson**, manager of research engineering, and **C. Gerald Day**, research and plant liaison engineer.

• **William H. Eichengreen** has been appointed manager of the Commercial Research Div. of the Inland Steel Co., Chicago. This unit will be constituted as a new division of the company's sales department. Mr. Eichengreen was formerly assistant manager of the Sales Promotion Div., specializing in sales analysis and market research.

• **W. W. Maloney**, formerly business manager, has been appointed secretary and chief administrative officer of American Foundrymen's Assn., succeeding **R. E. Kennedy**, who becomes secretary emeritus. Mr. Maloney first was associated with the AFA office from 1929 to 1935, when he became assistant advertising manager of the Burlington Railroad. He rejoined the association in 1942 and has served successively as staff assistant, assistant secretary and business manager.

• **J. B. Trescott** has been appointed to the Westinghouse Electric Supply Co.'s headquarters organization as St. Louis rural electrification authority representative. Mr. Trescott will be in charge of negotiation of contracts with the REA, leaving his position as Midwest district apparatus and supply manager.

• **W. H. McCormick** has recently been appointed chief metallurgist of the Park Works, Crucible Steel Co. of America, Pittsburgh. Mr. McCormick has been with Crucible for 17 years and was previously with Republic Steel Co. and Allegheny Ludlum Steel Co.

• **Richard E. Marx** has been appointed a vice-president, Detecto Scales, Inc., Brooklyn. He will also continue in his present capacity as sales manager.

• **Maj. Charles H. Warner** has been appointed manager of the Clark Equipment Co.'s Washington office.

• **K. B. Stuart** has been appointed manager of sales, Chemical Div., and **J. S. Besser**, manager of sales, Fuel Div., Colorado Fuel & Iron Corp., Denver. Mr. Stuart joined CF&I in 1924 and since 1938 has been assistant manager of sales, Byproducts Div. Mr. Besser became district manager of sales at Wichita, Kan., in 1924 and was appointed assistant sales manager, Fuel Sales Div., in 1930, which position he has held until the present time.

• **Herman L. Wanderman** has resigned as president and director of Tubular Service Corp., New York, and has formed the Consolidated Tube Sales Co., New York.

• **Edgar W. Bartz** has been appointed welding specialist for the San Francisco Bay area of Westinghouse Electric Corp.

• **Lee H. Hill**, vice-president in charge of industrial relations at the Allis-Chalmers Mfg. Co., Milwaukee, since 1941, has resigned his position to accept a post with the McGraw-Hill Publishing Co., New York. He has been a member of the Allis-Chalmers organization since 1931. Prior to becoming vice-president in charge of industrial relations, Mr. Hill was assistant manager of the electrical department.

OBITUARY...

• **Ralph M. Williams**, 63, for 20 years an official of the Packard Motor Car Co. until his retirement in 1943, died Aug. 14.

• **Henry M. Lane**, one of the best known foundry experts in the country, died suddenly in a Detroit hospital recently at the age of 77. He had been a consultant and engineer in the building of many foundries here and abroad, having followed his father in the metalworking field.

• **William White**, secretary and general manager of Euclid Crane & Hoist Co., Euclid, Ohio, died Aug. 15.

• **Leonard B. Hall**, 61, an executive of American Can Co., died Aug. 18 at his home near Chicago. He had been associated with the firm since 1901.

Dear Editor:

CARBIDE GEAR HOBS

Sir:

In the June 21 issue, there was an article entitled "Report on Carbide Hobs" by Lt. Alfred J. Kroog and R. W. Righter of the Navy. We would appreciate very much receiving two copies.

T. V. BUSK,
Advertising Manager
Farrel-Birmingham Co., Inc.,
Ansonia, Conn.

● Tear sheets have been mailed.—Ed.

STABILIZED HEAT TREATMENT

Sir:

In the June 21 issue there was an article on the results of stabilized heat treatment on welded 18-8 stainless steel. We would like, if possible, to secure 10 or 12 reprints.

F. A. GORMAN,
Manager
Industrial Steels, Inc.,
Cambridge 41, Mass.

● Tear sheets have been mailed.—Ed.

FORD BEARING ALLOY

Sir:

The subject article in the March 29 issue interested us very much. We would also appreciate additional data which you may have at hand or could obtain for us on this subject.

R. R. JANSSEN,
Material and Process Engineer
North American Aviation, Inc.
Inglewood, Calif.

● We would suggest that specific questions be directed to R. H. McCarroll, executive engineer, Ford Motor Co., Dearborn, Mich. —Ed.

CF&I GENEVA INTEREST

Sir:

Your Aug. 16th issue contains an article dealing with the interest of The Colorado Fuel and Iron Corp. in the Geneva plant.

May I ask you to correct two statements therein which are directly attributed to me. I did not infer that political pressure from Washington prevented the (U. S. Steel) Corporation from acquiring the mill, nor that Mr. Charles Allen has any thoughts other than to continue his investments in the steel business.

I hope it will not be inferred from your article that I presumed to set forth Mr. Allen's attitude towards either Fontana or Mr. Kaiser.

Very truly yours,

JACOB L. HOLTZMANN,
Counsellor at Law

● The error in reporting is regretted.—Ed.

COLOR CODE

Sir:

Will you kindly send me one set of tear sheets on the article "Color Code for Bar Stock" appearing in the July 12 issue?

H. W. WHITNEY,
Metallurgical Engineer
Bliss & Laughlin, Inc.,
Harvey, Ill.

● Tear sheets have been mailed.—Ed.

PRECISION CASTINGS

Sir:

I have followed with considerable interest your articles on precision castings. It seems that considerable progress has been made in the U.S.A. with this process. A number of firms in this country are also using the technique. Unfortunately, all the issues containing the articles have not reached this country. Accordingly, I am very pleased to know that you have collected them into a single booklet and would be glad to obtain a copy.

A. DUNLOP,
Director
Precicast, Ltd.,
Birmingham 24, England

Sir:

Kindly send us two reprints . . .

E. M. ANGER,
Metallurgist
Duraloy Co.,
Scottdale, Pa.

● A compilation of nine articles on this subject is obtainable at 60c each.—Ed.

DPC PLANT DISPOSAL

Sir:

Enclosed you will find 10c. for a reprint of Iron & Steel Plants Disposal Report as mentioned in your June 21 issue.

J. Z. BRIGGS,
Metallurgist
Crucible Steel Co. of America,
New York 17

Sir:

We would appreciate receiving a reprint . . .

G. A. WRIGHT,
Manager
E. I. du Pont de Nemours & Co.,
Wilmington, Del.

Sir:

Enclosed find 10c. . . .

A. W. RUTTKAMP,
Manager
American Steel & Wire Co.,
Cleveland, O.

Sir:

We would appreciate receiving two copies . . .

DR. PAUL F. CADMAN,
Henry J. Kaiser Co.,
Oakland 12, Calif.

● Reprints have been mailed.—Ed.

METAL POWDER SIZE

Sir:

Please send tear sheets on "Particle Size Analysis of Iron Powders in Powder Metallurgy" from your May 17 issue.

ROCKAWAY ROLLING MILL
Rockaway, N. J.

● Tear sheets have been mailed.—Ed.

RUST PREVENTIVES

Sir:

Please send me a copy. . . .

R. A. PETERSON,
Metallurgical Dept.
Packard Motor Car Co.,
Detroit 32

Sir:

As requested, we are enclosing 25c for five copies of the article, "Specifying Rust Preventives," which appeared in the Journal issue.

T. G. ROEHNER
Socony-Vacuum Oil Co.,
Brooklyn 22

● Tear sheets have been mailed.—Ed.

KIRKSITE CONTAMINATION

Sir:

In your articles on the use of Kirksite dies in aircraft drop hammer fabrication, mention is made of the pouring of lead into the die. It is my understanding that Kirksite contains only a trace of lead and should like to find out why lead is poured into the die and whether this would be likely to contaminate the alloy.

KURT WEINBERG,
Sales Manager
International Minerals & Metals Co.,
11 Broadway, New York

● Molten antimonial lead is poured into the Kirksite die as a ready means for casting the punch. The lead hardens almost immediately upon contact with the die, whose melting point is appreciably higher. If there is any lead contamination of the Kirksite zinc-aluminum-copper alloy, it should be confined to the surface and readily removable.—Ed.

CASTING INSPECTION

Sir:

The article appearing in the June 7 issue entitled "Magnesium Alloy—Aircraft Casting Inspection," by Robert Taylor, appears to be mainly concerned with means for breaking down the thin surface shell that obscures voids lying near the surface. The process proposed is perhaps quite satisfactory from the standpoint of the inspector, inasmuch as it enables him to uncover voids that are normally obscured, but like so many inspection processes, Mr. Taylor seems to have little concern for the damage that may result to the casting from the treatment that he suggests.

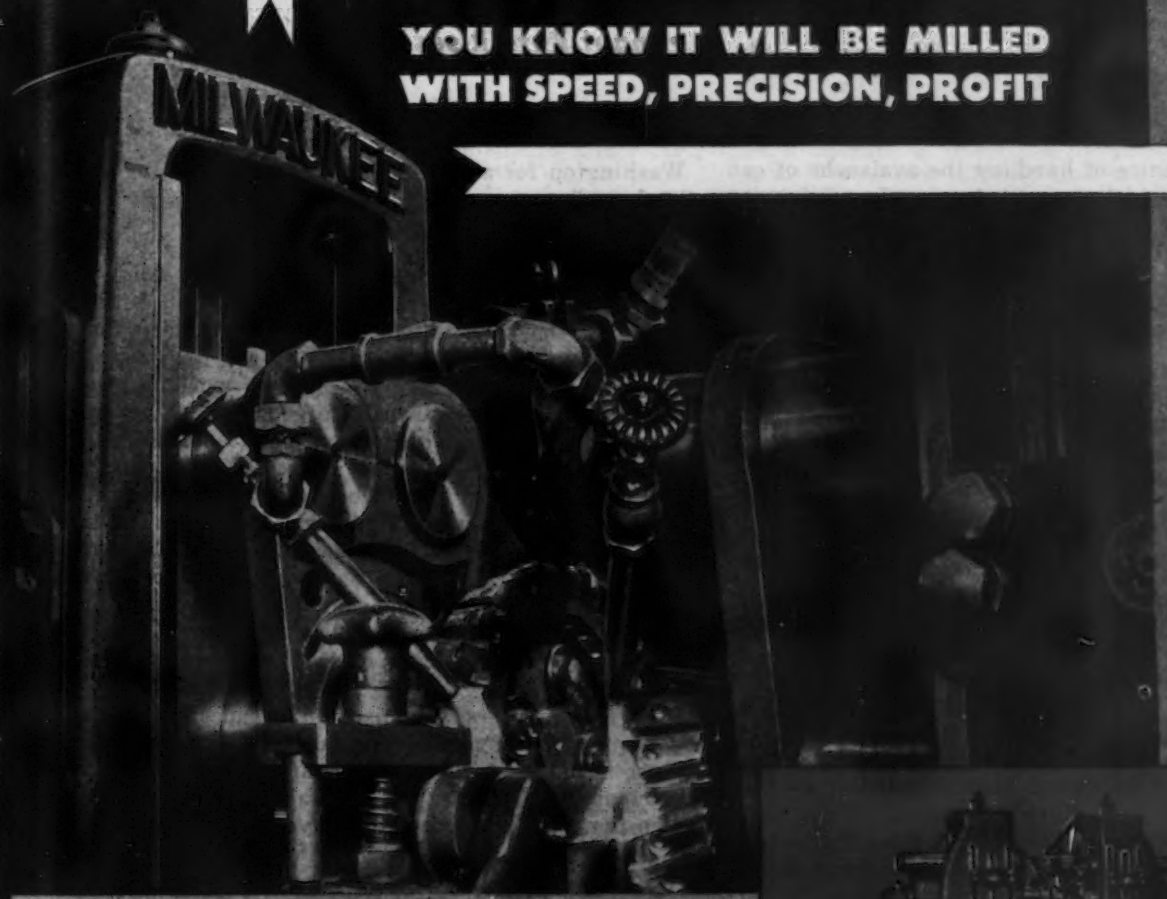
The article states, "A sand-blasted surface has a lowered corrosion resistance. . . ." This, of course, is incorrect. It is quite possible that Mr. Taylor is concerned with superficial corrosion which is aggravated as the surface is roughened. However, any process that induces a compressive stress reduces the rate of corrosion in depth and since it is deep corrosion that eventually results in failure of highly stressed members, Mr. Taylor should be more fearful of the rate of penetration of corrosion than of superficial effects.

While sand-blasting is not the best method of inducing compressive stress in magnesium castings, it is certainly better than no treatment at all, and it is wrong to assume that the cold worked surface should be removed before the castings are given a final acceptance stamp.

L. A. DANSE, Chairman,
G. M. Metallurgical Committee
General Motors Corp.,
Detroit

"WHEN YOU PUT IT ON A *Milwaukee*"

YOU KNOW IT WILL BE MILLED WITH SPEED, PRECISION, PROFIT



The straddle milling operation on this 1236 Milwaukee Duplex Milling Machine requires flexibility in spindle positioning because the milling cuts are at different levels. . . . Independent spindle speeds are necessary because the job required the use of two diameters of cutters. . . . "Anchoring" the spindle quill with the quill support mounted on the overarms, insures vibration-free operation in either "out" or "in" position.

1800 Series Milwaukee-Duplex Milling Machine

KEARNEY & TRECKER CORPORATION

MILWAUKEE 14, WISCONSIN

KNOWN as "production type" machines the Milwaukee Duplex series of milling machines offer important advantages:

— automatic trip table mechanism provides for continuous cycles of table movement.

— adjustable nut for *climb milling* eliminates backlash in the table feed screw. This feature permits machining a workpiece ordinarily difficult to hold for milling operations — results in increased feeds, improved finishes — anchored quill construction securely supports the quill behind the spindle nose in all positions.

These features plus the compact rigidity and sturdiness designed and built into the machine assure fast, precision production at less cost. Write for new Bulletin No. B20, giving complete details on the Milwaukee Duplex and Simplex Series of Milling Machines.

Milwaukee Machine Tools

This Industrial Week . . .

- **Cancellation Confusion Subsiding**
- **Rated Orders Still Plentiful**
- **Ingot Rate Rises to 77 Pct**

THE mechanics of handling the avalanche of cancellations which descended upon the steel industry in the past few weeks are being completed this week. Within a week it is expected that those steel mills which have had to cut steel output in order to clear up order difficulty will be operating at a higher level.

Order cancellation volume this past week has approached pre-V-J Day levels. Most steel companies have completed the task of clearing order books of all business which has been cancelled and have prepared new schedules which this week will go into effect on finishing mills. While there will be additional cancellations from time to time, the greatest part of this phase of reconversion in the steel industry has been completed.

Some steel companies found it necessary to reduce the output of steel ingots because their ingot capacity was balanced with their finishing mill facilities. In view of a severe drop and in some cases a wiping out of steel plate backlogs as well as a reduction in unfilled structural orders, some of the larger steel firms were forced to cut back steel ingot output last week to a greater extent than other companies. This, however, is a temporary situation until steel mill schedules reflecting a good product mix have been established.

Contrary to some reports in the industry large quantities of steel for nonrated orders will not be immediately available although the outlook for October indicates an easier situation. The controlled materials plan will not be scrapped until Sept. 30. Hence, much rated business now on the books for delivery before that time will be shipped. Furthermore, a good order volume this past week indicated a fair amount of rated business which will continue in that category because of the substitution of a new limited priority system at the end of September.

One factor which for the time being at least may prevent some of the larger companies from shipping a much greater volume of nonrated business soon is their obligation to ship small non-integrated steel mills a stipulated tonnage of semi-finished steel under WPB orders each month. This type of order is known as "further conversion," and during the war was for the purpose of making sure that smaller companies manufacturing finished steel products from semi-finished material would have adequate supplies. This practice took a substantial tonnage from some of the larger mills and unless the prewar status of this type of business is re-established, some large units may have difficulty in regaining their normal sales pattern. Part of this system however, may be retained by Washington for awhile and labeled as an aid to "small business."

DESPITE the flood of cancellations recently there appears to be little hope for large-scale deliveries of cold rolled sheets much before the fourth quarter, although some small shipments are being made. Sheet demand for the fourth quarter appears to be well in excess of capacity and producers are working alllotment systems of their own to spread available tonnage among customers. This action will tend to return purchasing relationships to a prewar basis and to eliminate dislocated buying brought on by the war.

Steel makers pointed out this week that several products were virtually untouched by cancellations. These included rails, track accessories, concrete bars, tin mill products, skelp and some stainless steel. Alloy steels were hard hit by cancellations with the result that electric furnaces are operating far below rated capacity.

Wire producers have disposed of cancellations and they are operating on a normal basis. A heavy increase in purchases by railroads and public utilities is anticipated. The substantial rural electrification program is expected to require heavy wire tonnages.

Freight car awards include the purchase by Pere Marquette of 250 50-ton auto box cars from Ralston Steel Car Co. and 100 70-ton hopper cars from Greenville Steel Car Co. Reading Co. has placed 750 70-ton covered hopper cars with Despatch Shops. St. Louis & Southwestern has awarded 250 50-ton box cars to Mt. Vernon Car Co. and will build 70-ton flat cars in its own shops. Canadian Export Board has placed with three Canadian builders 600 cars for Belgium.

Steel ingot output this week increased 6.5 points to 77 pct of rated capacity from last week's revised rate of 71.5 pct. Because of the variation in operations among most steel companies a definite trend is not yet discernible, but some steel officials look for a higher than 80 pct rate within the next two to three weeks.

Those small steel companies which have been allowed to charge higher than the ceiling prices on certain products are still accepting business on that basis, although some firms are meeting their competition. Fear is expressed, however, that when more steel is available these premiums cannot be obtained with the result that the smaller steel companies may suffer financially. Because of this situation it is expected that a new request for higher steel prices may develop soon. Larger steel companies are already on record for a further upward revision in steel prices and some companies have expressed the belief that some relief may be in the offing.

• **FABRICATED STEEL AWARDS**—July bookings of fabricated structural steel for bridge and building construction, reported to the American Institute of Steel Construction by companies representing 73.6 pct of the total average bookings of the industry during the years 1923-1925, totaled 72,167 tons as compared with 103,901 tons reported for the preceding month and 90,043 tons reported for the month of July 1944. The reported shipments for bridge and building construction totaled 51,465 tons compared with 45,328 tons reported for the same month last year. The reported tonnage available for future fabrication at July 31 was 193,977 tons.

• **AUTO OUTPUT SCHEDULES**—First 1946 Hudsons will be completed soon according to the Hudson Motor Car Co. Studebaker Corp., South Bend, states that it plans to resume passenger car production early in October and to attain higher levels of manufacture in the final quarter of the year than had been authorized. Initially, Studebaker's entire passenger car production will be concentrated on the Champion, in the low-price field. The Champion engine line remained intact throughout the war, with production diverted to Weasel, personnel and cargo carrier, and its entire output now can be diverted to civilian use. Production facilities for higher priced Studebaker models were dismantled. Nash plans to be in limited production between Sept. 20 and Oct. 5 with Kelvinator refrigerators appearing at an earlier date. Nash hopes to boost its automobile production from the prewar level of 89,000 units annually to a postwar peak of 250,000 in nine months reaching the maximum prewar rate by the end of the year.

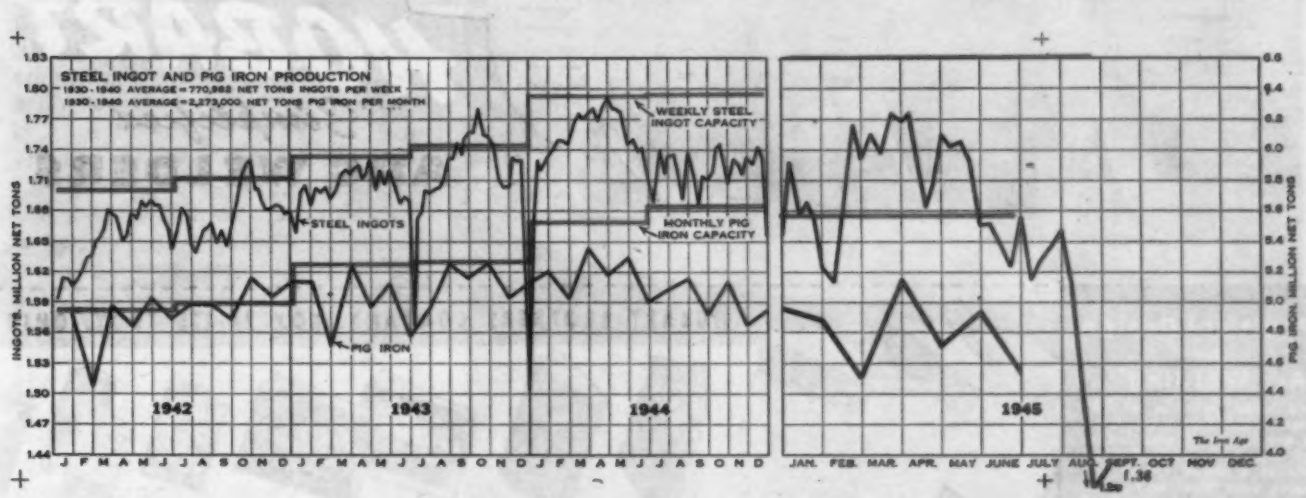
• **AVAILABLE GOVERNMENT TOOLS** — Between $600 million and $700 million worth of government machinery and tools will be made available for sale in the Detroit region within the next 90 days, according to the regional RFC office. The tools and equipment will be moved from plants and stored in temporary Army warehouses at nine points in the Michigan area. The RFC estimates about 15 pct of the machinery has already been stored at the yards, comprising 3200 shipped dating back to October 1944. It has been estimated that about 15 pct of the 60,000 to 75,000 machine tools now in war production will be maintained by the automobile manufacturers. During the same 90-day period 21 surplus plants valued at nearly a billion dollars will be offered for sale, including the Willow Run Plant.

• **TRUCK OUTLOOK**—The motor truck industry will have to exceed its previous pace to meet even the now abolished WPB allotment, W. E. Fish assistant general sales manager, Chevrolet Motor Div., General Motors Corp. declares. He says, "Even to meet the 440,000 unit allotment set up before all wartime controls were abolished, the industry would have to produce at an unprecedented pace during the fourth quarter of this year—and in some instances as much as two or three times the best previous rate of manufacturing. The case of Chevrolet alone illustrates the point. With an allotment of 140,000 trucks for the second half of this year, we will have to produce at the rate of 35,000 a month in the last quarter to meet this schedule.

• **SCRAP STEADY THIS WEEK**—After a promise that the scrap market might now be headed downward last week, such indications this week have been entirely lacking and there is evidence of firmness in the market throughout the country. With nearly all scrap grades in every district selling at ceiling prices, only one price recession developed this week. All markets showed that the combination of inventory shortages, labor shortage and slow scrap movement was a matter of concern to consumers who are unwilling to gamble on the shortage under low wartime ceiling prices.

• **MARINE SURPLUS DISPOSALS**—New and used surplus marine property disposals, including transfers to other agencies, amounting to $11,599,746 with reported returns of $9,385,275 for a recovery of 81 pct of reported cost was announced by the U. S. Maritime Commission in a 12-month report covering the agency's disposal activities to June 30, 1945. Cumulative declarations from various government-owning agencies to the commission, which is the exclusive marine property disposal agency for the government, were $20,445,057. Inventory balance on hand June 30, 1945, was $8,845,311, representing a disposal of 57 pct of all surplus materials declared to it during the 12-month period ended June 30.

• **ALUMINUM DELIVERIES**—Deliveries in September on all standard aluminum items were being quoted this week as the producers staggered out from under the avalanche of war business cancellations and began to schedule all available civilian business. The transition from exaggerated production of the war developed high strength alloys (heat treatable) to the prewar types used for novelties and the like offered the only serious problem in the industry's reconversion picture. The Aluminum Co. of America reported cancellations of war business amounting to $200,000,000, with a total orders on the books of civilian business amounting to $26,000,000. According to the company this figure was low as a result of a lack of pressure by sales offices to get orders in as long as books were filled with war business.



Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
August 21.....	55.0*	80.5	56.5*	89.0	73.5*	71.0	80.0	94.0	83.0	83.0	88.0	84.0	93.5	71.5
August 28.....	66.5	82.0	67.5	89.0	87.5	71.0	85.0	94.0	98.5	55.0	88.0	84.0	80.0	77.0

*—Revised.

Plants Who Produced Regular Line During War Reconverting Rapidly

New York

• • • **Reconversion** in many consuming industries throughout the country continued this week to reflect the slowness in military cancellations to come through in definite form. This same situation also applied to such heavy industries as steel and foundries.

Companies producing the same line of products for civilians as they did for war purposes are making far quicker progress on reconversion than was expected, while others are lagging far behind due to the general hysteria of confusion which seems to still pervade industry three weeks after the war has ended.

In an attempt to get a spot check without elaborate survey methods which would make such a report obsolete in the fast moving events, THE IRON AGE attempted early this week to at least feel the pulse of the changeover going on in various major industries. The results are shown below.

FARM IMPLEMENT COMPANIES—Principal bottleneck is said to be gray iron and malleable castings. This has been a matter principally of labor rather than capacity and is expected to clear up rapidly. No mention was made of any other material not being available within a reasonable time.

AUTOMOBILE COMPANIES—The industry will make a faster comeback than was generally expected possibly because of definite planning put into operation some time ago according to several companies. No particularly serious bottlenecks are expected to be a delaying factor after Oct. 1. Fabrics and tin have been tight, but fabrics are already becoming easier. On the question of tin companies are looking for substitutes.

AUTOMOTIVE PARTS—Most companies contacted appeared to be in fair shape as far as inventories are concerned. One large company plans to add men at reconverted plants within 60 or 90 days. Price policy is still a major factor and if solved satisfactorily, mass peacetime production is expected within 60 days.

RAILROAD EQUIPMENT AND FREIGHT CARS—Most companies are in excellent shape with no material bottlenecks to hamper increased production. They have held allotments on necessary material for heavy production and deliveries are satisfactory. Labor shortage was a partial factor in reconversion but this is clearing up.

HOME APPLIANCES—On irons, toasters, mixers, etc., nickel and chrome and nicrome wire have been a considerable bottleneck to mass production. Plastics for handles are also said to be a delaying factor. Steel appears to be available without difficulty. Some companies, however, find cold rolled sheet and strip a delaying factor in immediate large output of electric household appliances.

INSTRUMENT COMPANIES—Most firms in good shape because they will manufacture on the same basis as during the war.

MOTORS AND OTHER ELECTRICAL EQUIPMENT—Tin, solder and babbitt are still short as are silicon steel strip and sheet. Silicon steel shortage constitutes a problem in increasing output of electric meters for utilities. A clean-up in the steel mill order situation may expedite the delivery of silicon steels greater than is now expected. Motors will constitute no problem because of civilian needs paralleling war requirements.

BOLT AND NUT MAKERS—One major company reflecting the general industry outlook indicated that quantities of wire and wire rods on hand would enable a rapid satisfaction of civilian needs. Having made practically the same product for war purposes, the only hold-up might be additional steel. However, by the time the cancellation confusion is cleared up steel is not expected to be a bottleneck.

SMALL FABRICATING COMPANIES—Some firms are accepting deliveries on nonrated orders for late October and November. They claim steel mills are telling them that rated business still exists and that this must be filled before structural shops can obtain material for small nonrated jobs.

STRICTLY WAR PLANTS—Firms which have grown up since the war are finding it more difficult to get started on reconversion. Planning for new products, obtaining the necessary personnel and establishing new sources of material are the main bottlenecks to rapid reconversion.

BUICK MOTORS: *Not for the new cars, but for a special bus, these engines are the first semblance of automotive engine production on the Buick lines in more than three years. This production line is temporary, while actual reconversion is under way.*

Limited Priorities Control System Replaces CMP September 30

Washington

• • • **Elimination of the priorities control system effective Sept. 30 and substitution of a new, limited system for use during the reconversion period was announced by WPB on Aug. 22.**

These changes which were made through amendments to Priorities Regulations 28 and 29 provide for:

1. Immediate cancellation of all ratings calling for delivery after Sept. 30, with the exception of the AAA emergency, the MM military and the new CC bottleneck ratings. AA ratings, however, will still apply to textiles.

2. Formal revocation of CMP effective Sept. 30 as previously announced.

3. Immediate cancellation of all steel, copper and aluminum allotments for the fourth and subsequent quarters.

4. Revocation of Priorities Regulation 30, effective immediately.

5. Introduction of a new, non-extensible, civilian CC preference rating to be used sparingly to break reconversion bottlenecks and, where necessary, insure continued production and services.

Cautioning that its general policy is not to assign priorities assistance for non-military needs, the WPB pointed out that an applicant for CC ratings must show that delivery cannot be obtained on an unrated basis and that the item is a bottleneck holding up minimum production, or that it is needed for reconversion construction or other essential construction.

The CC rating may be assigned, where needed, to increase production of reconversion bottleneck items or, in other cases, to protect public health and welfare or in extraordinary hardship cases. The CC rating, WPB said, may also be assigned in limited cases for essential exports. However, WPB Chief of Staff J. D. Small emphasized that CC export ratings would be granted only to break bottlenecks and would under no circumstances discriminate against domestic production.

Small business will continue to be given the opportunity to obtain its fair share of material, the WPB explained, instructions have been issued to give special consideration to small business needs in considering applications for the new CC ratings.

In explaining the non-extensible feature of the new CC rating, WPB pointed out that it cannot be extended by a supplier to get production materials or components needed to make the item sold to his customer, or replace inventory materials used in its manufacture or for any other reason.

The AA rating system and CMP remain effective for deliveries between now and Sept. 30, it was pointed out, but all preference ratings in the AA series are immediately cancelled on purchase orders calling for delivery after that date. All AA ratings on purchase orders for delivery after Sept. 30 must be regarded by suppliers as unrated WPB said. The MM rating will be continued for the time being to support the requirements of the occupation forces and other military needs.

Military orders bearing AA ratings may not be automatically rerated MM, the WPB emphasized, and those calling for deliveries after Sept. 30 will be treated as unrated the same as non-military orders bearing ratings in the AA series. Most military orders have already been unrated in accordance with Direction 1 to Priorities Regulation 29 issued Aug. 18.

CMP inventory limitations and controls on other materials are being maintained and strengthened wherever possible, WPB said, to prevent hoarding, purchase scrambles or preemption of scarce materials.

CED Issues Call For Reemployment Aids

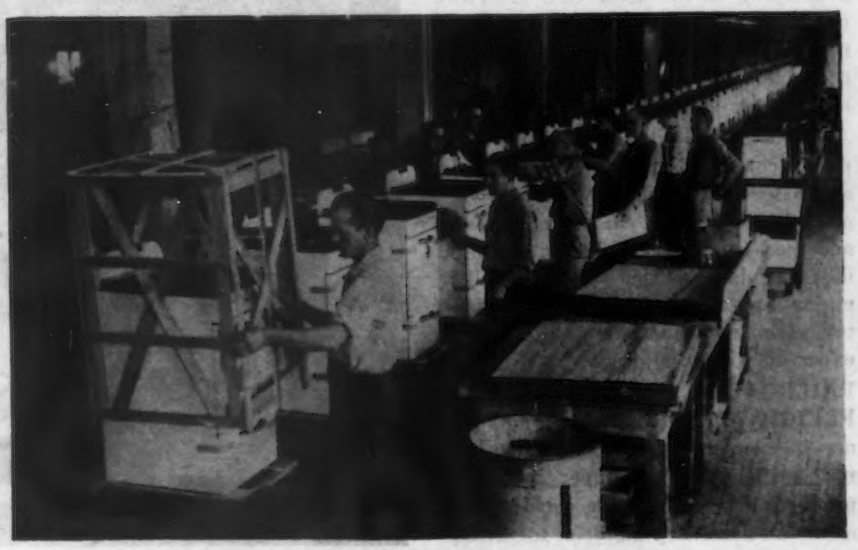
Washington

• • • **The CED Research Committee today released a comprehensive Statement of National Policy containing recommendations for facilitating reemployment and for assisting those workers unavoidably idle during the changeover period.**

The report, issued in Washington by CED spokesmen, was highlighted by emphasis on: rapid demobilization and strengthened aid and protection to veterans in obtaining civilian jobs; prompt state action to raise unemployment compensation benefits and to extend duration of payments; a strengthening of public Employment Services to aid postwar migration and to assist the speedy placement of both veterans and civilian workers; rapid blueprinting of a "reserve shelf" of public works for use if and when needed; provisions for retraining workers for their new postwar jobs; and finally, a strong recommendation that individual employers at once put into effect their postwar plans for rapid business expansion and the creation of new jobs.

The Committee opposes arbitrary reductions in the pre-war normal work week solely for the purpose of sharing employment. "We do not want to freeze unemployment into a short work week, since a national 'share the work' policy is a 'share the unemployment' plan," declares the report.

RECONVERTED 105 MM. LINE: ***Finishing touches go on stoves which are among the trickle of civilian goods coming off lines this week. The scene is at Cribben & Sexton Co., Chicago.***



Crowley Proposes Program To Bridge Gap Following End of Lend-Lease

Washington

• • • Pointing out that discontinuance of lend-lease when V-J Day is officially proclaimed must cause economic difficulties and readjustment in the Allied countries, Foreign Economic Administrator Leo T. Crowley submitted a six point program for winding up lend-lease to a news conference on Aug. 24.

Since lend-lease will not be used for the purposes of relief, rehabilitation or reconstruction or elsewhere, the following transitional program has been offered to the Allied governments:

1. That all new procurement by Foreign Economic Administration be discontinued except where Allied Governments wished to make cash payments or to arrange Export-Import Bank credits for such procurement.

2. That Allied Governments be given the opportunity to acquire all items they have ordered that now are in the process of manufacture by giving to the United States an obligation calling for equal annual payments over a period of thirty years and bearing an annual interest rate of 2⅜ pct. (Decisions under this provision will have to be rapid, since FEA must determine whether or not manufacture of many items should be completed.)

3. That inventories now on the soil of Allied Governments and goods in process of delivery to them shall be made available to them on a cash or credit basis.

4. That Foreign Economic Administration would continue its procurements services and facilities for a period of 60 days after V-J Day to give Allied Governments time to set up their own procurement agencies.

5. That War Shipping Administration be advised to continue the use of United States shipping facilities for the needs of Allied Governments for a period of 30 days after V-J Day to permit those governments to schedule their own shipping facilities.

6. That shipments under lend-lease be continued until V-J Day in order to give the Allied Governments time to work out arrangements for continuing the flow of supplies to their soil on a cash or credit basis.

Mr. Crowley said: "In the case of Allied Governments that chose to take advantage of this program, there is no reason why there should be any interruption whatever in the flow of vitally needed peace goods.

"We believe that the program set forth meets the intent of Congress and provides for an efficient means for Allied Governments to maintain a continuous flow of goods from this country."

He further indicated that since countries likely to use this program, such as Britain, France and China, would probably do so by means of Export-Import bank credits, the capitalization of the bank currently set at $2,800,000,000 would have to be increased.

G.E. Establishes Marine Warehouses

Schenectady

• • • Warehouse stocks of more than $1,000,000 worth of replacement parts have been established at New York City and San Francisco as part of a new marine service established by General Electric, according to an announcement by R. S. Neblett, manager of the company's Federal and Marine Divisions.

The servicing arrangement will permit maintenance and most overhaul jobs on propulsion or other operating equipment to be taken care of while a ship is being unloaded and refilled with cargo, Mr. Neblett says. The service has been established primarily for the high-efficiency C-type ships and turbine-electric drive tankers built during the past eight years under the U. S. Maritime Commission program.

At New York, the new service is under the supervision of R. A. Williamson, G-E marine engineer there. George Barr, marine supervising engineer for G-E on the West Coast, has charge of the service at San Francisco. New waterfront warehouse facilities have been obtained and stocked at both cities.

"Fast turnaround is going to be more important than ever to profitable shipping in the postwar period," Mr. Neblett said. "A primary purpose in setting up our new servicing arrangement is to keep G-E equipped ships of the U. S. Merchant Fleet operating at top efficiency in the busy days ahead."

EARLY ITEM: *Portable radio sets, in production at Galvin Mfg. Co. plant in Chicago will be an early item in the civilian production race.*

Ingot Brass Shipments Down

Chicago

• • • Combined shipments of ingot brass and bronze for July totaled 27,995 short tons, it has been announced by the Defense Council of the Ingot Brass and Bronze Industry here. This is a drop in shipments from 32,613 tons last month and represents the latest in a series of declines from a wartime average approximating 40,000 tons per month.

Murray Sounding Keynote for Wage Drive by Unions

Pittsburgh

• • • **Philip Murray,** CIO president, sounded the keynote this week for the beginning of a new drive for wage increases in the steel industry when he stated that the Wage Policy Committee of the CIO-USWA would meet in Pittsburgh on Sept. 11. Speaking at a mass meeting at Munhall, Pa., sponsored by Local 1397 of the United Steel Workers, Mr. Murray said that a "demand for substantial wage increases" would be made, and pointed out that the CIO would find out very soon how dead the Little Steel Formula was. Mr. Murray was not definite as to how much of a wage increase would be requested, but Buffalo and Detroit CIO Auto Workers have asked for 30 pct.

Mr. Murray stated that, while the CIO is behind full employment legislation, he emphasized that he is not favoring a return of WPA or relief. The CIO believes that every able-bodied citizen able and willing to work should be given an opportunity to work at a profitable occupation at high wages. American labor must interest itself in the speedy enactment of the full employment bill and the bill improving the system of old age pension.

Reasons for the wage increase, he stated, were: The general rise in living costs; reduction of the work week to 40 hr with consequent loss of income to workers; and legislation protecting industry's profits. He also mentioned that continuous efforts were being made by the union to carry out its plan for a guaranteed annual wage for workers.

The meeting on Sept. 11 will be the first attended by the new Wage Policy Committee. Heretofore, a Wage Policy Committee designated by the National office of the CIO handled such matters, but at the convention in Cleveland last year a resolution was adopted for the election of a Wage Policy Committee by CIO districts. This reduced the size of the committee from about 400 to about 150.

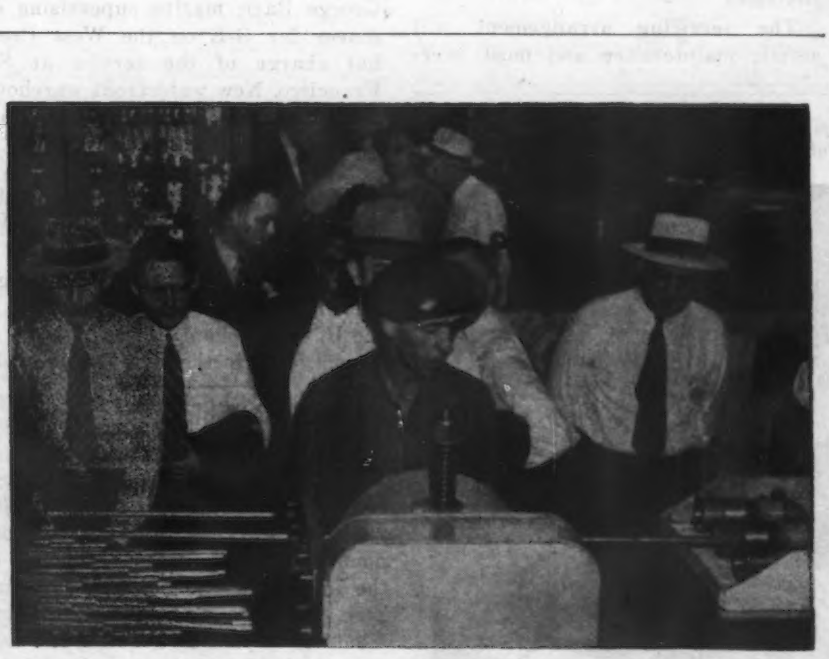
Rack-Type Drawbench Developed by Aetna-Standard on Display

Youngstown

• • • **A new rack-type drawbench** developed by the Aetna-Standard Engineering Co., Youngstown, was demonstrated at its Ellwood City plant Aug. 20, with more than 150 representatives of various manufacturing industries in attendance. The group also toured the large war plant, which is continuing to operate at a high rate of production, although many of its military contracts have been canceled. The visitors represented the steel, copper, brass, aluminum and other metal industries, which already have placed large postwar orders with Aetna-Standard for the drawbenches and other types of tools.

The drawbench was developed during the war by Aetna-Standard in collaboration with one of the foremost brass companies to improve quality of finished products, especially thin-walled tubing, and also to cut the amount of floor space, improve handling of materials during operations and improve feeding and loading of machines.

The change-over from war to peacetime production will require little shifting of the plant's machinery and equipment. The plant's main contract will run until the end of September and there is a large volume of new business on the books for postwar delivery in civilian industry.



DRAWBENCH: *More than* 150 *representatives of industry gathered recently to see a demonstration of an Aetna-Standard rack type draw bench. Quick reconversion to peacetime models is promised by the company.*

Ore Consumption Increased in July

Cleveland

• • • **Consumption of** Lake Superior Iron ore during July this year amounted to 6,532,273 gross tons of which U. S. furnaces used 6,331,306 tons and Canada used 200,967 tons, acording to report of the Lake Superior Iron Ore Association. This compared with a total of 6,397,091 tons in June when U. S. consumption was 6,182,513 and Canadian consumption was 214,578 tons. In July a year ago U. S. furnaces used 7,153,698 tons, Canada used 218,035 tons, making the toal 7,371,733 gross tons.

Cumulative consumption for the year to August 1 was 45,395,396 tons by U. S. furnaces and 1,483,180 tons by Canada, totaling 46,878,576 gross tons, as compared with a total of 51,661,963 tons to the same date a year ago when U. S. consumption was 50,138,315 tons and Canadian furnaces used 1,523,648 tons.

Ore on hand at furnaces and Lake Erie docks Aug. 1, 1945 amounted to 29,485,221 gross tons as compared with 24,847,472 tons a month ago and 32,069,216 tons on the same date a year ago.

There were 158 U. S. and 7 Canadian furnaces in blast August 1 when there were 27 U. S. and 3 Canadian furnaces idle. This compares with 162 and 7 U. S. and Canadian furnaces respectively in blast a month ago and 170 U. S. and 7 Canadian furnaces in operation a year ago.

Army Specifies 252 Surplus ASF and AAF War Plant Facilities

Washington

• • • Government owned plants totaling 252 in number were declared surplus this week by the War Department, including 220 serving the Army Service Forces and 32 producing for the Army Air Forces.

These 252 plants were built at an estimated cost of $1,484,352,337 and cover 49,478,000 sq ft. The types of plants include aircraft, tanks, explosives, artillery and small arms, chemicals, steel, radio and radar, shipbuilding and ammunition. The machine tools and production equipment of these, with few exceptions, will become surplus also.

The ten largest, representing an estimated cost of $593,443,434, include two government-owned parts of the Ford Motor Co. River Rouge plant at Dearborn, Mich., one manufacturing aircraft engines, and the other, tanks, engines armored cars, steel and malleable castings and other items. The other eight are the Des Moines Ordnance Plant, Des Moines, Iowa; Gopher Ordnance Works, St. Paul, Minn., Illinois Ordnance Plant, Carbondale, Ill.; Keystone Ordnance Works, Geneva, Pa.; Milan Ordnance Center, Milan, Tenn.; Okla. Ordnance Plant, Pryor, Oklahoma; Plum Brook Ordnance Works, Sandusky, Ohio; and the Sangamon Ordnance Plant, Illiopolis, Ill.

Most of the government-owned plants operating for the War Department not included in the attached list have been selected tentatively to be held in standby for national defense purposes or retained for storage facilities. Some, however, will remain in limited production for the manufacture of research or test items. It is expected that some plants scheduled for retention will be released from time to time as conditions permit.

Plants scheduled for retention in standby will, if possible, be made available for lease to private industries on civilian production. If some are desired for purchase by commercial enterprises, the War Department will cooperate so far as possible in releasing these plants and retaining others, now listed for surplus, in their place.

Revocations

WPB revocations during the week included the following:

L-257-c — Production schedules for farm machinery.

M-21—Iron and Steel.

Direction 5—ferro columbium.

Direction 6 — tungsten and molybdenum wire.

Direction 7 — chromium and chrome metal.

Direction 8—nickel and nickel alloy products.

L-303—Distribution and production of wire screen cloth.

M-300 Schedule 62 Primary Chromium Chemical

NYU Announcing New Metallurgical Courses

New York

• • • Evening courses in Industrial Research and Powder Metallurgy have been announced for the fall term by the Graduate Division, New York University. The research course will be presented by a group of directors of research from industry, and will be held on Thursday evenings at 7:30 to 9:30.

The powder metallurgy course will include both lectures and laboratory work, on Tuesday and Friday evenings, 7:00 to 10:00 P. M. This course is being offered by Adjunct Professor Goetzel of the Department of Chemical Engineering.

Further information may be had by contacting Mr. H. J. Masson, assistant dean, Graduate Division, College of Engineering, N. Y. U., University Heights, N. Y. 53, N. Y.

Salary Controls Lifted

Washington

• • • Stabilization rules have been modified to permit individual salary increases subject to certain conditions, the Treasury Department announced Aug. 22.

Salary increases may now be given persons making $5,000 or more without prior approval of the Department, it was said. At the same time, increases may be granted non-union administrative, executive and professional workers making less than $5,000 a year.

Increases may now be made without prior Treasury Department approval, it was said, where such increases will not be used to obtain upward adjustment of price ceilings, will not be used to resist justifiable price decreases and in the case of government contracts where no increase in costs to the government will be involved.

This new policy, it was pointed out, applies to salaries, bonuses, commissions, fees, incentive pay and all other types of compensation.

DOLOMITE THROWER: *This machine perfected by the Blaw-Knox Co. is equipped with a Diesel-electric generator set which provides the power needed to propel the machine along its route without having to depend on the charging floor crane. Bin capacity is 450 cu. ft.*

Hinckley Recognizes Severance Pay

Washington

• • • A cost memorandum dealing with severance pay on terminated war contracts was issued Aug. 27 by Robert H. Hinckley, director of contract settlement, as amendment No. 3 to Office of Contract Settlement Regulation No. 14.

This new termination cost memorandum, No. 16 in the series of such memorandums, defines severance pay as amounts due to employes solely by reason of their involuntary separation from employment with the contractors. It says that a reasonable amount may be included for severance pay in termination settlements, provided the contractor is required to make such payments by statute, written agreement, or by the operation of an established policy.

While the memorandum recognizes severance pay as a cost that may be included in termination settlements, the amount applicable to a settlement will usually be very small because, under the memorandum, severance payments are held to be not directly applicable to any particular termination, but rather as applicable to the entire period of employment with the contractor.

Scrap Mission Is Bound for Europe

Washington

• • • A mission of two representatives each of the steel, the iron and steel scrap, and the nonferrous metal industries will be dispatched shortly by the War Department to the European theater of operations to make a first hand survey of and report on scrap and allied matters.

The mission, which is to leave from Washington or New York about Sept. 12, will be abroad 26 days. It will visit France, Belgium, Germany, Italy and England. It will check on the battlefield scrap that is available, ascertain possible facilities for handling it, confer with representatives of the government abroad and also with representatives of the British, French and Italian governments.

A recommendation will be made by the committee on its return whether to abandon this material abroad, or to return it to the United States to replenish the depleted supplies of metallics, or to dispose of it abroad.

The personnel of the mission, which was chosen by the War Department after consultation with Robert W. Wolcott, chairman of the scrap committee of the American Iron & Steel Institute, is as follows:

For the iron and steel scrap industry: Joel Claster of Luria Bros. & Co., Philadelphia; Edwin C. Barringer. president and executive secretary of the Institute of Scrap Iron & Steel, Inc., Washington.

For the steel industry: L. D. Greene, Bethlehem Steel Co., and N. Ebersole, American Rolling Mill Co.

For the nonferrous metal industry: J. B. Neiman, Federated Metals Div., American Smelting & Refining Co., Detroit, and Carl O. Thieme, H. Kramer & Co., Chicago.

The mission will be accompanied by Col. Bonneville L. Neis, of the Production Div. of the Army Service Forces and Capt. Leonard Abrams of the Readjustment Div. of the Army Service Forces.

Inventory Controls Altered to Prevent Buyers' Scrambles

Washington

• • • Continuing inventory controls needed to prevent hoarding, buyers scrambles and accumulation of excessive inventories of materials and components, WPB on Aug. 28 issued a new regulation which incorporates inventory rules formerly contained in Priorities Regulation 1 and CMP Regulation 2, designated PR 32.

All kinds of materials are covered by the new regulation, WPB said, including raw or semi-fabricated materials commodities, equipment, accessories, parts, assemblies and products of any kind, whether or not acquired by priorities assistance.

Restrictions on ordering more than needed which formerly applied only to rated orders generally, now apply to all except those materials which are in ample supply, WPB said. These include among others aluminum, capital equipment (if acquired under PR 24 or on an unrated basis), jigs dies and fixtures to steel and brass pipe fittings, steel and iron valves, and mineral aggregates such as sand, gravel, crushstone and slag.

WPB said this list will be expanded as additional materials and products are determined to be in ample supply.

Steel and copper inventory rules formerly contained in CMP Reg. 2 and directions thereunder are unchanged from the standpoint of limitations and minimum sale quantities.

The provisions of the new inventory regulation, WPB emphasized, apply to each item in any class listed which is different from the other items by reason of varied specifications. If a steel or copper producer makes delivery earlier than on the date specified by his customer, it may be accepted and the limits of this regulation exceeded to the extent that the excess results solely from early delivery.

OPA Price Program Approved for Industry

Washington

• • • The Office of Economic Stabilization has approved extension to the entire reconversion field of the industry-wide price program announced for most consumer durable goods by OPA Aug. 23.

Under an OES directive dated Aug. 25, OPA will issue orders specifying the percentage amount by which manufacturers may increase their 1941 ceiling prices for the goods coming back into production, and in addition will spell out distributor pricing methods by which it is expected that all or most of these increases can be absorbed before the goods are offered for sale to consumers.

In brief, the OPA program is to grant increases at the production level to compensate for cost increases since 1941, when necessary to assure maximum production, but to require wholesalers and retailers to absorb a substantial amount of these increases where their margins reasonably permit them to do this. In this way OPA expects to hold to a minimum the increases consumers must pay for the products newly coming back into production.

OPA may also require manufacturers to produce about the same proportion of inexpensive items, compared to luxury type items, as they produced in 1941. This provision, which will be invoked only when the stabilization program is endangered, is intended to avoid increases in the cost of living to low and medium income families who would otherwise be forced to buy in price lines beyond their limited means.

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Modern **MACHINING FACILITIES**

These 28" ball-and-socket joints for a pontoon dredge line very aptly illustrate two vital aspects of PSF production: the inherent soundness and uniform structure of PSF steel castings; and the close-tolerance machining and expert assembly work that are a strong part of the service we're equipped to render. PSF's advanced foundry techniques and laboratory controls, amplified by complete and highly modern finishing facilities, constitute a background for true quality work—steel castings that will meet the most exacting conditions your jobs may impose. ● Let us figure on your casting requirements.

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Automotive Parts Prices Freed As Outline of Detroit Prices is Shown

Washington

• • • Suspending price control on automotive parts sold as original equipment, OPA Administrator Chester Bowles on Aug. 27 announced a three point formula under which prices for new passenger automobiles will be determined.

Under OPA's reconversion pricing formula, ceiling price adjustments are based on costs in the last period of normal production, to which are added increases in basic wage rate schedules and materials costs plus a normal peacetime margin of profit. The new pricing rules provide that the base costs to be used are those for 1941 models. The profit factor will be either the manufacturer's own 1936-39 margin or one-half the industry average for that period whichever is higher.

These standards were given to the automobile manufacturers in conferences held in Detroit last week, and the companies are now engaged in computing their ceilings, which will become effective on approval of their figures by OPA.

Pointing out that on the basis of studies conducted during the past several months it seems unlikely that there will be any general increase in the factory level of automobile prices, Mr. Bowles said:

"However, OPA's reconversion formula is to be applied by each manufacturer on the basis of his own experience. The facts will tell the story. If any ceiling increases are called for by our pricing rules, of course, they will be granted.

"If I should be wrong in my present expectation and there should be a general increase in factory prices, our next step would be to see whether absorption of all or part of the increases could reasonably be required of automobile dealers. The courts have declared that it is obligatory for OPA to do this. President Truman's executive order of Aug. 18 emphasized this duty.

"We are already conducting a study of automobile dealer margins, and no action would, of course, be taken until the facts are in and the dealer groups have been consulted.

"In view of the foregoing it is a fair assumption that the public is unlikely to pay more for most 1945 model cars than the present ceilings on 1942 models—minus the special charges that were allowed beginning early in 1942 to cover added costs to dealers from rationing.

"If, however, manufacturers make any substantial changes from their 1942 models which result in net increases or decreases in costs, OPA will provide for increases or decreases in ceilings. Any increases caused by such changes naturally need not be absorbed by dealers.

"Since manufacturers are now working out the application of OPA's pricing formula to their 1945 models for submission to OPA, it is obviously impossible to state at this time what changes in present ceilings, if any, may result.

"Any rumors that 1945 ceilings for any make and model are now definitely known are, therefore, untrue."

If the price computed according to the OPA formula is higher than the manufacturer's 1941 model price, Mr. Bowles said, "this will become his new ceiling price. If it is below his 1942 price, that 1942 price will stand. As I have said, provision will be made in either case for substantial model changes resulting in net cost changes.

"It must be remembered that the automobile industry increased the price of its 1942 models by from 10 to 19 pct over the prices of the 1941 models. Since the adjustment for cost increases now authorized by OPA's formula are to be applied to a 1941 model base, these 1942 model price increases will serve to cushion the effect of these cost adjustments.

Regarding the suspension of ceiling prices on original equipment parts, Mr. Bowles said:

"OPA reached the decision that the tailoring of price adjustments to as intricate a market as the automobile parts market was very difficult administratively, and could not be done with accuracy without delays which would have postponed the return of the automobile manufacturers to production.

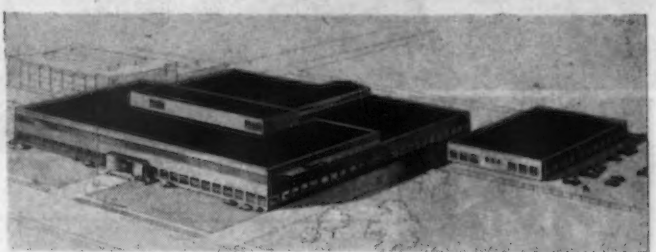
"Considering the strong buying position of the automobile manufacturers and the excess capacity of many parts manufacturers because of the ending of the war, OPA is quite certain parts prices will not go higher on the average than OPA would allow under ceiling prices adjusted in accordance with OPA's reconversion standards."

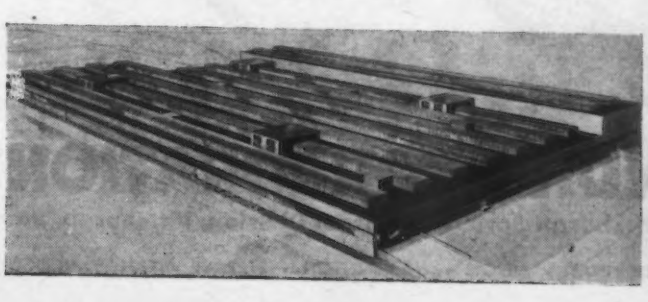
General Motors Construction On Way

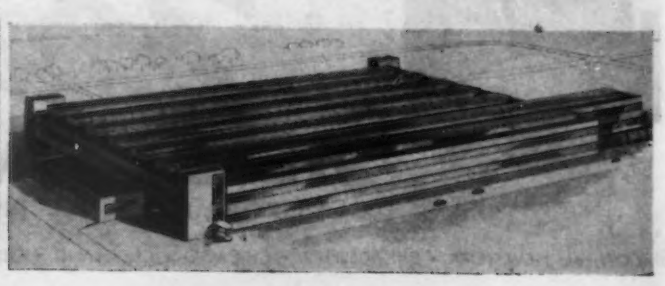
o o o

Right, new G. M. engineering building and experimental shops to be constructed in Pontiac, Mich. Building at right will be new dynamometer laboratories.

Below, new assembly plant to be built at Pontiac.
Lower right, new engine plant to be constructed at Pontiac.







This Girl Is Wrapping Up a *New* Production Tool

In 1917, A. O. Smith developed a method of coating electrodes with paper, which shielded the welding arc and produced welds of materially improved ductility and tensile strength—a revolutionary advance in the relatively primitive art of welding.

Now in 1945, continuous welding research in A. O. Smith laboratories and plants makes possible the fabrication of 28,000-pound stern frames for cargo ships by the electric arc welding method—a process involving standard SMITHway electrodes and a mastery of modern welding preparation and techniques.

The Proof Is in Production

Welding research never ends at A. O. Smith. It goes on in the laboratories. It goes on in actual daily production. Every day more than 320,000 SMITHway electrodes are used in A. O. Smith plants on parts and products ranging from the smallest and simplest to the largest and most complex. Millions are used in the plants of other manufacturers. Everywhere far-sighted management is studying how welding — the modern production tool — improves quality, cuts costs, simplifies production.

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Ready for delivery soon, the expanded line of A. C. Welders includes three new models of 150- 200- and 250-ampere capacity, in addition to the HEAVY DUTY MODELS of 300- 400- and 500-ampere capacity. Write for complete specifications and prices.

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Profit Factors On Eight New Groups Announced by OPA

Washington

• • • **Profit factors for eight classes of consumer and industrial items including textile, printing and paper mill machinery, household vacuum cleaners, washing machines and ironers, stoves (except electric), metal household furniture and miscellaneous hardware were announced by OPA last week.**

The factors will be used in connection with the reconversion pricing orders of July 23. These orders are basically relief measures, OPA said, but can be used also for working out satisfactory individual adjustments for manufacturers in reconverting industries who are ready to resume civilian production ahead of other firms in the industry.

When the industry-wide actions (which make up the major part of OPA's reconversion pricing program) are taken for any of these industries, manufacturers who wish to shift to the industry-wide formulas may do so, the agency said.

The general profit factors previously announced were for industry groups each including a number of consumer durable industries, and in some cases were lower than the more specific factors announced Aug. 21. Later, more specific factors may be issued for certain types of miscellaneous hardware and industrial machinery products covered by the factors announced today, OPA said. Manufacturers who have already calculated ceiling prices using these factors will then have the option of recalculating their ceiling using the applicable new factors—which will presumably be closer to the industry normal peacetime margin over costs.

Reconverting manufacturers of the items included in the action may calculate new ceiling prices as follows: they will adjust their 1941 total costs for increases since that time in materials prices and basic wage rates of factory workers, and to the adjusted figure they will apply the appropriate profit factor.

However, the agency pointed out, manufacturers with annual sales of less than $200,000 have the option of using either the profit factors announced today, or their own average 1936-39 margins over cost. Firms doing less than $50,000 business a year are permitted to base their reconversion ceilings on total current costs instead of on adjusted 1941 costs.

Since the industry-wide formulas will be issued only for industries that have been entirely or largely out of civilian production during the war, reconverting manufacturers in industries that did not convert as a whole to war work will continue to use the individual adjustment orders, applying the profit factors announced for their respective industries.

The adjustment orders with the profit factors will be used also by firms needing a higher price than would result from the industry-wide percentage increase to their individual 1941 prices.

Products included in this action, and the applicable profit factors, are: Domestic stoves (coal and wood, oil gas combinations, gas cooking and gas heating)—3.7 pct; domestic washing machines and ironers—2.6 pct; metal household furniture—2.4 pct; vacuum cleaners—4.6 pct; miscellaneous hardware (excluding products under the new regulation covering builders' hardware)—5.1 pct; paper-mill, pulp-mill and paper products machinery—4.2 pct; printing-trades machinery and equipment—3.0 pct; textile machinery—6.0 pct.

"In Line" Prices To Be Used on Machines, Parts, Equipment

Washington

• • • **Requests for establishment of price ceilings on machines, parts and industrial equipment may be subject to the limitation of "In line" price, OPA announced Aug. 25.**

An "In line" price, OPA explained, is one based on that of the most nearly comparable item already priced and being sold in the general trade.

Effective Aug. 24, 1945, manufacturers of machines, parts and industrial equipment who are seeking ceiling prices are to submit to OPA the usual financial data, it was said, including a schedule of operating costs, the manufacturer's usual mark-up and a description of the item to be priced. Where cost information is not available, the manufacturer may request an "In line" price.

The price to be approved by OPA will be either cost plus the manufacturer's usual mark-up or an "In line" price as calculated by OPA.

"In line" pricing of electrical products, OPA said, has proved highly satisfactory and it is because of this experience that the "In line" limitation may now be applied to machinery, parts and industrial equipment prices under revised Maximum Price Regulation No. 136 (machines, parts and industrial equipment).

OPA also announced that manufacturers with newly-erected plants, beginning Oct. 23, 1945, must use their 1941 or 1942 base date labor rates and material costs in calculating their ceiling prices for products made in the new plants. The revocation of the incentive provision, which previously permitted use of rates and costs in effect when new plant operations were begun, will put manufacturers who now propose to engage in production in new plants under the same pricing provisions as manufacturers who were producing the same or similar commodities on the base date. This action will not, however, for the present require a manufacturer who in the past has received written approval to change his price determining methods and to go back to 1941 and 1942 base rates and costs.

Manufacturers are authorized to use labor overtime rates in calculating ceiling prices for machinery products if their base date overhead costs included such rates, or if on the base date their pricing methods included a percentage applied to direct labor costs. In all other cases, however, overtime may no longer be used in computing list prices.

Manufacturers who have determined their maximum prices by means of a price determining method by relation to cost, have in the past received an advantage over the manufacturers who had published or established prices on the base date. OPA pointed out that to permit these prices to be established as maximum list prices would be inequitable, as most manufacturers who have published or established prices used only straight time wage rates in computing these prices.

Acting Ordnance Chief Name

Washington

• • • **Maj. Gen. Henry B. Sayler, chief ordnance officer of the European theater of operations, has been appointed Deputy Chief of Ordnance and will head the Ordnance Department while Lt. Gen. L. H. Campbell, Jr., Chief of Ordnance, is on duty with the Office of War Mobilization and Reconversion.**

OPA's Reconversion Price Program

ANY RECONVERTING MANUFACTURER IS FREE TO SELL AT EXISTING CEILING PRICES. However, in any case where price adjustments are necessary to provide a prospect of good profits when production gets rolling, OPA WILL PROVIDE RECONVERTING MANUFACTURERS WITH NEW PRICES in one of the following ways:

• • •

I-INDUSTRY-WIDE ACTIONS

THIS IS THE BASIC PART OF OPA's RECONVERSION PRICE PROGRAM FOR RECONVERTING INDUSTRIES.

OPA CONSULTS WITH INDUSTRY:

① AT MEETINGS
② BY CORRESPONDENCE

} *NECESSARY PRICE ADJUSTMENTS ARE MADE IN THE FOLLOWING WAY:*

TAKE 1941 COSTS...	ADD ADJUSTMENTS FOR LEGAL INCREASES IN:		THEN ADD 1936-39 AVERAGE PERCENTAGE MARGIN OF PROFIT ON COSTS	THIS GIVES THE NEW CEILING PRICE (1941 Price was $97.00)	IN THIS EXAMPLE, THIS WORKS OUT TO AN "INCREASE FACTOR" OF 11.1%	ANY FIRM IN THIS INDUSTRY CAN INCREASE ITS 1941 PRICE BY THIS PERCENTAGE (11.1%)
	MATERIALS AND PARTS PRICES	BASIC WAGE RATES SCHEDULES				
			8% of $101.00 			
$90.00	$4.00	$7.00	$8.08	$109.08	11.1%	

INDIVIDUAL FIRMS THAT NEED BIGGER ADJUSTMENTS MAY APPLY FOR THEM UNDER THE INDIVIDUAL-FIRM ADJUSTMENT PROVISIONS AT THEIR OPA DISTRICT OFFICES.

• • •

II-INDIVIDUAL-FIRM ADJUSTMENT PROVISIONS

There are three circumstances under which a particular reconverting firm may apply for necessary individual adjustments.

① A firm that needs bigger adjustments than the industry-wide price increase factor allows.

② A firm returning to civilian production before its industry requests and receives an industry-wide price increase factor.

③ A firm in an industry which will not have an industry-wide price increase factor because the industry as a whole never converted to war production.

HOW FIRMS OF VARIOUS SIZES FIGURE THEIR INDIVIDUAL PRICE ADJUSTMENTS

FIRMS EXPECTING GROSS ANNUAL SALES OF LESS THAN $50,000

① TAKE TOTAL CURRENT PRODUCTION COSTS . . .

② ADD OWN PROFIT MARGIN FOR FIRST OF FOLLOWING YEARS—1939, 1940, OR 1941—FOR WHICH FIRM HAS FIGURES

OR

OPA'S INDIVIDUAL ADJUSTMENT PROFIT FACTOR* . . .

***RESULT*—NEW CEILING PRICE**

FIRMS EXPECTING GROSS ANNUAL SALES BETWEEN $50,000 & $200,000

① ADJUST OWN 1941 COSTS FOR

A. INCREASES IN OWN STRAIGHT-TIME FACTORY LABOR RATES. . .

B. LEGAL INCREASES IN OWN MATERIALS AND PARTS PRICES. . .

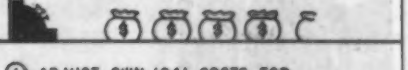
② ADD OWN 1936-39 PROFIT MARGIN. . .

OR

OPA'S INDIVIDUAL ADJUSTMENT PROFIT FACTOR* . . .

***RESULT*—NEW CEILING PRICE**

FIRMS EXPECTING GROSS ANNUAL SALES OVER $200,000



① ADJUST OWN 1941 COSTS FOR

A. INCREASES IN OWN BASIC WAGE RATES SCHEDULES. . .

B. GENERAL LEGAL INCREASES IN OWN MATERIALS AND PARTS PRICES. . .

② IF THESE ADJUSTED COSTS ARE HIGHER THAN EXISTING CEILING, ADD OPA'S INDIVIDUAL ADJUSTMENT PROFIT FACTOR* . . .

***RESULT*—NEW CEILING PRICE**

*Individual adjustment profit factors will be provided by OPA District Offices along with application forms.

Aluminum and Magnesium Price Ceilings Lifted; Steel Not Affected

Washington

• • • **Suspension of price** controls on primary aluminum, ingot and pig aluminum, most aluminum castings, primary and secondary magnesium, magnesium scrap, magnesium castings, and die castings was announced by OPA Administrator Chester Bowles on Aug. 24.

The order which also revokes price controls on mercury is illustrative of the OPA decontrol policy, Mr. Bowles said, and was made possible by the drastic change in the supply-demand situation of th se basic materials. Although demand will pick up rapidly as reconversion progresses, production capacity will be more than ample with the result that controls can be safely suspended, he said.

Steel price ceilings are not expected to be removed, Mr. Bowles said, until such a time as the supply demand situation straightens itself out and requirements of the larger users, such as the automobile industry, have been ascertained and met.

Two additional points in the OPA program were previewed at the same time. First, an action which will speed up the setting of prices for new businesses and, secondly, a new order providing for individual company adjustments in most manufacturing fields which will be forthcoming shortly.

Under the new procedure, Mr. Bowles said, businesses in the consumer durable goods field will either take prices in line with the comparable product of an established manufacturer or they may get their own temporary prices on a cost-plus basis.

Under the new orders providing for individual company adjustments, it was pointed out, a manufacturing firm suffering an over-all loss on operations at normal volume may receive price adjustments sufficient to bring it to a break-even position.

Although described as a "general rescue clause," Mr. Bowles emphasized that it was not intended as a bail-out for inefficient concerns at the expense of the consumer public. These orders provide for adjustments on a basis of temporarily limited production. However, they do not apply to manufacturers reconverting from war work who are already covered by the special adjustment provisions of Supplementary orders 118 and 119 (THE IRON AGE, July 26, page 106).

Specially Designed Equipment May Be Disposed of as Scrap

Washington

• • • **Specially designed** surplus equipment in contractors' plants, but owned by the government, which can only be used in the manufacture of the product for which it was designed, may be disposed of as scrap under an amendment to Surplus Property Board Regulation 6. The amendment covers jigs, dies, fixtures, gages, molds, and similar equipment.

Owning agencies may dispose of this special tooling to the contractor in possession at scrap prices if the tooling has no foreseeable use for civilian production.

Contractors must also offer such tooling to the owning agency for a period of 30 days and if the owning agency does not wish to purchase it the contractor may dispose of it as scrap.

If contractors in possession do not wish to purchase this equipment, for use or scrap, owning agencies will then dispose of it through regular surplus property procedures.

SWPC Continues To Make Plant Loans

Washington

• • • **The Smaller War Plants Corp.** will continue to make loans to small plants converting to civilian production, and the agency's 114 field offices throughout the country have been so notified, according to Maury Maverick, SWPC chairman.

SWPC, although a part of WPB, is under statutory limitation (Public Law 603) and will expire Dec. 31, 1946, unless extended by Congress.

In the three years that it has been in operation, SWPC has authorized financial assistance to small plants, in loans and machinery leases, totaling $333,091,505.

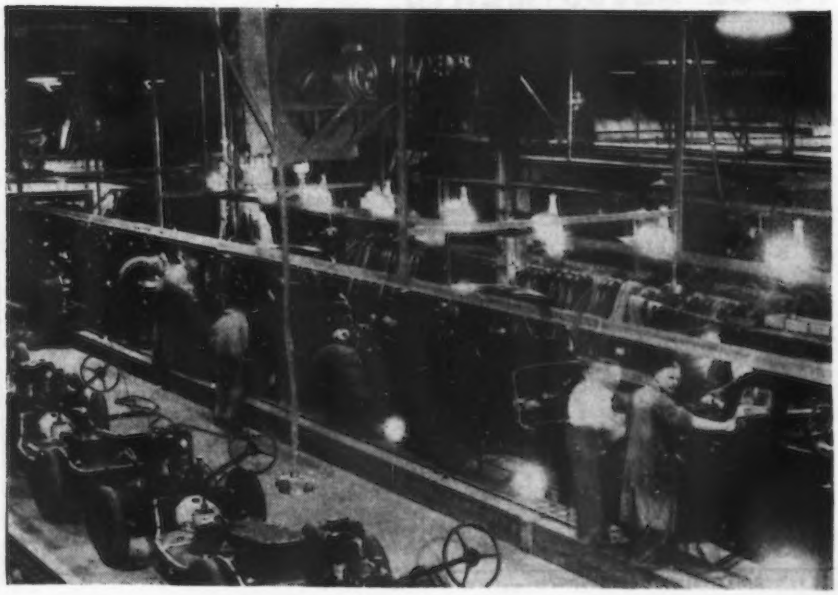
"Spot" Plan Ended

Washington

• • • **Priorities Regulation 25, the "Spot Authorization Plan," has been revoked, WPB announced Aug. 25.**

Once the keystone of WPB's reconversion program, spot authorization is no longer necessary in view of the plentiful supply of most materials which may be secured on an unrated basis or, in the case of bottlenecks, through application of CC ratings under Priorities Regulation 29.

AUSTIN LINES: *Reconversion in this British automobile plant is well under way, although no production figures for this firm have been published.*



Controls Relaxed to Permit Additional Reconversion Construction

Washington

• • • **Relaxation of** controls to permit construction of industrial manufacturing, processing and assembling facilities without specific authorization was announced by WPB on Aug. 21. This is considered an interim move pointing to the revocation of L-41 possibly before Sept. 30.

This new policy, according to WPB, affects construction of factories, plants and other units used primarily for manufactuing and processing or assembling of goods or materials. Also affected are work on units not primarily used for such work if the construction is preliminary to industrial use, construction of facilities needed by a manufacturer for handling raw materials or components, or for the distribution of finished products.

Although private homes, commercial construction and public works are still controlled, some of the activities which WPB considers as qualifying under the new Direction 7 to Order L-41 to proceed with construction without authorization are:

(1) Mining, smelting and refining, foundries and other operations related to extraction of minerals and their conversion to finished form.

(2) Logging and lumbering operations, sawmills, planing mills and millwork manufacturers, excluding lumber yards.

(3) Pilot plants and industrial research laboratories.

(4) Food processing plants, slaughterhouses, commercial food freezing plants, commercial cold storage warehouses and food packing plants, bottling plants, grain elevators and canneries. This does not include grocery stores, butcher shops or frozen food locker plants serving individual customers, WPB pointed out.

Relaying Rail Prices Clarified by Bowles

Washington

• • • **Sellers of** relaying rail and used track accessories for export have been authorized by the OPA to add the same export premiums to domestic base ceiling prices as are permitted on export sales of new iron and steel products, under Amendment 1 to MPR 46 effective Sept. 4.

These premiums range from 6 to 12½ pct according to the quantity sold, and provision is made for extra allowances depending upon the terms of sale.

OPA also announced:

1. Clarification of the relaying rail price regulation to state clearly that persons warehousing relaying rail and used track accessories must maintain adequate facilities for stocking, reconditioning, shipping and receiving rail and accessories if they charge warehouse prices. The warehouse prices are higher than those railroad sellers may charge. A Class 1 railroad seller, for instance, is provided with a ceiling price of $28 per ton for 70-pound or heavier relaying rail, while the warehouse ceiling price for 70-pound or heavier relaying rail is $32 per ton for quantities of more than two carloads and $35.84 per ton for sales of two carloads and less.

2. The definition of relaying rail in the price regulation is broadened to include used rail used for any purpose other than scrap or re-rolling rail. This broadening to permit sale of relaying rail at relaying price for uses such as construction, cattle guards, mine props, fence posts and related uses, had previously been established for sellers by interpretations issued by OPA.

Surplus Inventories Freed for Production

Washington

• • • **In a drastic revision of** PR 13, WPB has freed nearly all materials in contract termination inventories and Government surplus in order that they may now be used for any permitted civilian production. However, special sales, that is, sales by persons who acquired or made materials for use and not for sale and sales of Government surpluses, of some scarce materials are still restricted under the regulation. These materials, still subject to domestic sales restrictions, include antimony, pig tin, uranium, rubber, mining equipment and machinery in the hands of mining producers, and domestic mechanical refrigerators.

The remaining materials subject to export special sales restrictions include antimony, babbitt, solder, tin, uranium, rubber, mining equipment and machinery, and domestic mechanical refrigerators.

Sales of contract termination inventories and Government surpluses are still subject to SPB regulations. Materials freed under the amendment to PR 13, effective Aug. 22, may not be used in violation of any remaining WPB orders.

Installation Charges Billed with Machinery

Washington

• • • **Sellers of** machinery and machinery products who supply installation services are no longer required to invoice separately the machinery and the installation services when billing customers, under OPA's Amendment No. 9 to RMPR 136, effective Aug. 30.

In normal trade practices, manufacturers of a number of machinery products, including elevators and industrial boilers, have billed machinery and installation services together, and the OPA action permits this practice to be followed.

However, individual records of prices charged for products and installation services must be available for OPA inspection at any time.

Overtime Pay Freed

Washington

• • • **Restrictions on** payment of overtime for work on Saturdays, Sundays and holidays have been rescinded with revocation of Executive Order 9240.

The regulations which applied to all work relating to prosecution of the war, provided that no premium wage or extra compensation should be paid for work on Saturday or Sunday except where part of the regularly scheduled work week. Payment of double time was allowed for the seventh day of a work week, time-and-a-half for the sixth day and for all in excess of 40 hr. Premium pay for holiday work was also restricted to specified holidays.

This action will have the effect of putting back into operation collective bargaining contracts that provide for higher overtime and premium wage payments.

Industrial Briefs . . .

• NEW CONTRACTS—F. H. McGraw & Co., New York, engineers and constructors, have received two contracts for new construction, aggregating $2,250,000, from the General Aniline & Film Corp.

The first contract is for a new power house to be built for the Ansco Film Div. of General Aniline at Binghamton, N. Y. The second contract is for a wash house at the Rensselaer plant of the General Aniline Works Div. of the corporation in New York. Construction will start immediately on both projects.

• NEW METALS PLANT — The Western Metal Specialty Co., Milwaukee, has acquired a site for a new factory.

• BUYS COMPANY—Clayton & Lambert Mfg. Co., Dearborn, Mich., has purchased the assets of the Monarch Mfg. Co., and will operate it as the Monarch Hardware Div., turning out brass foundry, machine shop and polishing and plating work as heretofore.

• ACQUISITION — Westinghouse Electric Corp. has acquired the B. F. Sturtevant Co., makers of ventilating and air conditioning equipment, which will be operated as a Westinghouse division. The main works of the Sturtevant concern are located in the Hyde Park district of Boston. Other plants are at Camden, N. J.; La Salle, Ill.; Berkeley, Calif.; and Gault, Ontario.

• ASTE MEETING — American Society of Tool Engineers, New York chapter, will hold its first meeting of the 1945-46 season at the Hotel New Yorker on Monday, Sept. 10. Mr. Theodore A. Hacker, field engineer, Federal Telephone & Radio Corp., Newark, N. J., will speak on "Electronic Heat-Treating in the Megacycle Range." Mr. P. E. Cavanaugh, chief metallurgist, Dumont Electric Laboratories, Inc., Passaic, N. J., will speak on "Electronic Metallurgical Inspection."

• BUYS COMPANY — Edw. S. Christiansen has announced his purchase of the property, patents and name of Bates Expanded Steel Corp., East Chicago, Ind. He will continue the manufacture of expanded steel poles, joists and other structural building products.

• BUFFALO BOLT BUYS — The Buffalo Bolt Co., North Tonawanda, N. Y., has announced purchase of the Eclipse Lawn Mower Co. of Prophetstown, Ill., from Lee Industries, Inc., New York, for $1,300,000 and 15,000 shares of Buffalo Bolt common stock.

• BUYS SEATTLE SITE — I. F. Laucks, Inc., subsidiary of Monsanto Chemical Co., has purchased a 29 acre site south of Seattle on which it will build a plywood adhesive plant, combining operations now carried in two present Seattle plants.

• FOREIGN TRADE DIV. — The Titan Metal Mfg. Co., Bellefonte, Pa., has created an International Div. with headquarters in New York. Mr. Jean P. Elkann will assume its direction.

• ACQUISITION—Hewitt Rubber Corp., Buffalo, has acquired a controlling interest in Robins Conveyors, Inc., Passaic, N. J.

• OPENS OFFICE — A. Milne & Co. has announced the opening of a new sales office in Cleveland, Ohio, in the Euclid Building, a new step in the expansion of the company's facilities for steel distribution.

• NEW DIVISION—A new Specialty Products Div. which will devote its efforts to small package and consumer items has been announced by the Dow Chemical Co., Midland, Mich. It will be headed by Sherman W. Putnam.

Certification Is Not Required on Request For Draft Deferment

Washington

• • • **Certification by Government** agencies of deferment requests are no longer required, national headquarters of Selective Service announced Aug. 24, 1945.

The end of the Japanese war and the announcement that inductions will be confined to registrants 18 through 25, except volunteers, it was pointed out, leave but relatively few cases requiring supporting certification. Federal agencies, however, may still submit information supporting deferment of a registrant under its jurisdiction, national headquarters said.

It was announced that employers will be required to submit, prior to Sept. 15, new deferment requests for any registrants for whom they desire renewal of deferment. Except for certification, the usual procedure will be followed.

Special consideration, it was pointed out, will still be given workers engaged in activities such as coal production, western railroads, air lines and the merchant marine.

Storage Center For Engines Established

South Bend, Ind.

• • • **An Army Air Force "redeployment center" for aircraft engines—the only one in the country—has been established here. Purpose center will be to store engines returned from overseas until they are recalled for military use or released to civilian buyers.**

The engines, of all sizes, will be processed chemically at the center for long-range anti-corrosion storage.

The engines will be run along a processing line, conveyed to an infra-red preheating oven and heated to a mass temperature of 180 deg. F., then moved along to a tank containing corrosion preventative compound heated to temperatures from 200 to 250 deg. F., where the engine is dipped, allowed to drain, and finally is reassembled and crated for storage.

Engines no longer needed by the AAF will be made available for civilian use through the Defense Plant Corp., it was explained.

Those which can serve a further military use will be put through one of the engine overhaul shops operated by the Air Technical Service Command.

WOULD *Two* STEERING WHEELS IMPROVE YOUR DRIVING?

Ridiculous? Of course! A separate control to guide each wheel would only serve to confuse the driver — make steering more difficult. A single control guiding both front wheels at once means better co-ordination — makes driving safer, easier, more efficient.

Single Control Helps Welding, Too

Two or more regulating devices are not necessary to control welding heat. On P&H Arc Welders, it is done with only one. There can't be any confusion about it. Volt-ampere regulation is automatic; the machine responds with exactly the right welding heat for downward, vertical or overhead welding with bare or coated electrodes. The absence of unnecessary dials, gadgets and special adjustments makes it easier for the operator; there are fewer mistakes; welding results are consistently better.

And P&H's Visi-Matic calibration enables you to select the exact welding heat for all classes of electrodes. Write for literature.

P&H Model WA-200 with single control and Visi-matic calibration. WSR (Welding Service Range) ratings tell you the exact amount of usable welding current the machine will deliver from minimum to maximum. Ask for literature about P&H welders and welding electrodes.

P&H ARC WELDERS

4401 West National Avenue
Milwaukee 14, Wisconsin

HARNISCHFEGER CORPORATION

ARC WELDERS • EXCAVATORS • ELECTRIC CRANES • P&H • MOTORS • HOISTS • WELDING ELECTRODES

A COMPLETE ARC WELDING SERVICE • WRITE FOR BULLETIN R7-3

DC WELDERS · AC WELDERS · WELDING ELECTRODES · WELDING POSITIONERS · WELDING PRODUCTION CONTROL SYSTEMS · ELECTRIC HOISTS · ELECTRIC CRANES

Simplified Practice Recommendations May Be Retained by Firms

Washington

● ● ● **Industries which simplified sizes** and varieties of their manufactured products during the war under mandatory WPB orders can retain the benefits derived from those programs by availing themselves of the machinery set up by the National Bureau of Standards.

The Bureau has received numerous inquiries from businessmen concerning post-war simplification on a voluntary basis. The steel industry particularly has shown active interest in the system of Simplified Practice Recommendations.

Prior to the war, many industries had benefited from the establishment of SPR's on an industry-wide basis, with manufacturers, distributors and consumers participating in their development. In general, the objective was to stop producing for stock purposes those sizes and varieties that moved slowly in the channels of distribution and to concentrate more on items in constant demand.

Savings along these lines have been considerable. Examples include that of pipes, ducts and fittings for warm air heating and air conditioning which were cut from 5,580 to 759 types or 86 pct. Pipe fittings of grey cast iron, malleable iron and brass or bronze were reduced from 8,566 to 2,969, or 65 pct.

The SPR's, as distinguished from WPB orders, are dependent upon the voluntary support of all interested parties—manufacturers, distributors, and consumers—and are confined to articles produced for stock purposes. Certain features of the wartime mandatory simplification practices cannot be applied in peacetime on account of legal restrictions

Keystone Steel Reports Biggest Sales in History

Peoria, Ill.

● ● ● **Largest sales** in its history were reported by Keystone Steel & Wire Co. for the fiscal year ended June 30, totalling $22,227,212 compared with $20,593,364 the previous year. Net profit was $1,588,209, equal to $2.10 a share, compared to $1,467,301 the preceding year. Shipments were 277,368 net tons as against 275,368 net tons in the 1943-4 fiscal year. Production declined to 293,692 net tons from 306,732 net tons in 1943-4.

Get the complete story on Macwhyte Slings

The benefit of our experience in supplying wire rope slings for industry everywhere is yours for the asking. Macwhyte Slings are custom-made to fit your particular needs. There are many types and assemblies—let us take care of your sling requirements.

We'll send you the complete story

Reliable safe loads and strengths on literally hundreds of slings are given you in the Macwhyte Sling Catalog S-7. Pictorial literature shows many ways of rigging up to handle loads safely. Just ask for Catalog S-7 and literature—send request on your company letterhead.

★ ★ ★ ★

MACWHYTE COMPANY

2911 FOURTEENTH AVENUE, KENOSHA, WISCONSIN

Manufacturers of the CORRECT wire rope for your equipment

Left & Right-Lay Braided Slings · Aircraft Tie-Rods
Aircraft Cable · "Safe-Lock" Swaged Terminals
Manufactured under U.S. and Foreign Patents

Mill Depots: New York · Pittsburgh · Chicago · Ft. Worth · Portland
Seattle · San Francisco · Distributors throughout the U.S.A.

Member National Safety Council

NO. 811-S

Many types and assemblies

Macwhyte ATLAS Round Braided Slings (patented). 13 sizes in 10 different types. Made from two pieces of wire rope . . . one left lay and one right lay. These two ropes are spliced endless, folded to secure the required number of parts, and then braided. All ropes form a continuous uniform spiral throughout the entire length of the sling.

Macwhyte DREW Flat Braided Slings (patented). 13 sizes in 10 different types. The flat braided body is made from one rope spliced endless before the braiding operation.

Macwhyte MONARCH Single Part Slings. 20 sizes in 10 different types. Wire rope slings having a single part body.

Other Macwhyte Slings

Macwhyte also makes Grommets, Multiple Part Slings, Y-Guard Slings . . . and the Level-Lift Sling that keeps unbalanced loads level. Macwhyte Sling Engineers will cooperate in designing the proper slings for your plant.

Buy an EXTRA War Bond!

RIGHT-LAY **MACWHYTE SLINGS FOR INDUSTRY** LEFT-LAY

"Lifting safety to new heights"

Macwhyte Wire Rope Slings are made to meet the capacity of any crane built

Diecasting Close-Fit Threads

(CONTINUED FROM PAGE 53)

minum sheet of a radio chassis, the lip is spun over making a secure fastening that cannot come loose. Nibs cast next to the shoulder fit corresponding notches in the pierced hole and prevent the socket from turning when a Lord mount is screwed into it.

Formerly, similar sockets were made from aluminum on the screw machine and were fastened with a nut similarly made. Such a nut, also made on the screw machine, is shown at lower end of top row, fig. 6. Such nuts gave trouble by coming loose under vibration, and could not be tightened without disconnecting many wires applied above them. No such trouble can occur with the diecast socket spun in place and it costs far less than the corresponding screw machine assembly.

The two lowest parts in fig. 6 are also diecast with male threads and have lips that are spun over to lock mating parts. Then the parts screw into sockets diecast with female threads as shown at top of fig. 7. Parts at top of fig. 8 are cap nuts having cast threads that go clear to the bottom of the hole.

In fig. 9 are shown six pairs of zinc-alloy expansion bolt shields diecast on one gate and below these a separate pair of shields that fit a lag screw of larger size. These parts have threads cast to mate with the screw but, as the shields are split, no unscrewing of cores is required. Such parts were formerly sand cast in malleable iron (as some still are) but diecasting is far more rapid and the castings cost less. The threads are tapered and are formed by cores set at the proper angle. It should be noted that the half-shields on the lower portion of the gate each have two projecting lugs near their lower ends. Half-shields on the upper portion of the gate have corresponding recesses to mate with the lugs. At subsequent assembly, the lugs are placed in mating recesses and are then bent inward around the mating half which is thus held in place.

This fastening is a loose one and is intended only to keep the halves from falling apart during shipment and until the shield is placed in the hole made to receive it. Assembly of each pair could be done separately but, to save time, two whole gates of sleeves are assembled with one closing of a die. In other words, two gates are laid face to face and are positioned partly by cast tapered dowel pins entering mating holes. One pin and one hole are seen in that part of the gate at extreme top of fig. 9. The mating gate will face against that shown and have a taper pin that enters the hole in the other gate while the taper pin on the gate shown will enter a corresponding hole in the gate laid over it. Mating is done in a trim die, fig. 10, in a punch press. Before the die is closed the half-shields each mate with their opposites and, as the die closes, it presses the lugs together and then shears each pair of shields from the gates, all in one stroke. Some flash is sheared off and that remaining is largely removed by later tumbling of the assembled shields. Complete removal is not necessary as the shields are low-priced hardware items that are never seen after installation in holes, in concrete or masonry.

Other diecastings are produced, but those illustrated here are among the parts that indicate the utility of diecast threads. Besides having proper threads made at low cost, the parts are made, of course, to far closer dimensional limits and with better finish than for malleable iron castings. Being nonferrous, the castings are not subject to red rust and are smoother and better in appearance than sand castings. Production rates are high and costs are moderate, making for all-around satisfaction.

500,000,000 Stampings With Carbide Dies

(CONTINUED FROM PAGE 36)

is available for punches and dies are:

(1) For paper blanking and notching.

(2) For blanking carbon steel strip up to 3/32-in. thick.

(3) For blanking and punching material up to 7/16-in. thick and with strength to withstand overhangs on punches up to ¾-in.

(4) For blanking materials over 7/16-in. thick and where the die must absorb heavy shock.

Diecasting Close-Fit Threads

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MACHINE TOOLS

. . . News and Market Activities

Machine Tool Order Books Still Confused Because of V-J Cancellations

Cleveland

• • • Uncertainty reigns supreme in the machine tool industry, specifically from the point of firm orders and manufacturing schedules. Customers and machine tool dealers alike are wondering whether those firm orders already on manufacturers' books will maintain their relative positions or whether they will be shuffled around in order to strengthen builders' positions with what might be called "preferential customers."

Building schedules have been hit very hard by cancellations of war business, and order book patterns have been completely wiped out. The resulting confusion is not a permanent thing by any means, but it will take a little while to bring reason out of the existing chaos.

The really bright spot in the whole picture is the avid efforts of industry as a whole to get reconverted and get production started on civilian commodities. This alone will aid tremendously in shortening the time element of readjustment and rescheduling of machine tool deliveries. Manufacturers and dealers of machine tools are being barraged with requests for delivery times on various tools, and the weight of such interest will speed up the time needed for builders to get their schedules in an orderly condition.

The dark spot in reconversion is the labor question. Both builders and users of machine tools have their tongues in their respective cheeks on this question. Signs point to labor strife, with the groundwork already laid for labor troubles in the automotive and steel industries. Should this become serious, reconversion will be delayed and the chaos that was started by cancellations on V-J day will be continued.

The surplus tool situation is a difficult one. Literally thousands and thousands of tools belonging to the government already form a supply pool. Quick programs for disposal of these tools is necessary, since many of them can be left standing right where they are and used for civilian production. For example, companies such as Tapco and Jack & Heintz have large numbers of DPC-owned machines stationed right in the production lines that are serviced by company-owned equipment. If these companies can lease or buy these DPC-owned machines at prices they can afford, their reconversion problems become simpler in that they do not have to wait deliveries on new machines. On the other hand, if the government removes these machines from standing production lines and throws them into a disposal warehouse, then those production lines will be disrupted until such time as the equipment can be replaced.

o o o

Prices Remain At Fixed Levels to June

Washington

• • • The Bureau of Labor Statistics' index number of prices for standard (non-specialty) machine tools was unchanged from January to June 1945. The composite average has remained at 118 per cent of the August 1939 average since September 1941, the level at which the Office of Price Administration fixed prices for the industry. Prices of boring mills advanced approximately 3.0 per cent as a result of price adjustments granted by the Office of Price Administration. This increase was not sufficiently large to change the over-all average.

The supply of machine tools eased somewhat during the second quarter of the year. Negotiations with Russia for whom a large part of the lend lease shipments had been allocated led to cancellation of the bulk of her orders and an agreement that only the most essential requirements were to be filled immediately. At the same time the industry was able to increase its shipments and reduce the total backlog of unfilled orders which at the end of June was equal to six months production at the current rate.

Table 1 shows the indexes for the period January 1939 through June 1945 by months. Table 2 shows the price range and index numbers for the first half of 1945 for each size and type of machine tool priced.

•

Monarch Plans Three Day Reconversion Discussion

Sidney, Ohio

• • • To facilitate reconversion of machine tool plants, the Monarch Machine Tool Co. is holding a three-day forum on Sept. 17, 18 and 19, to which have been invited representatives of both machine tool producers and users. The meeting will deal mainly with discussions of methods of reconversion, tooling problems, incentives, job evaluation, and machine shop practices.

Table I—Index Numbers of Standard Machine Tool Prices By Months January 1939-June 1945 Inclusive

(August 1939 = 100)

Month	Year 1945	1944	1943	1942	1941	1940	1939
January	118	118	118	118	114	106	100
February	118	118	118	118	114	107	100
March	118	118	118	118	114	108	100
April	118	118	118	118	116	108	100
May	118	118	118	118	116	108	100
June	118	118	118	118	117	109	100
July	...	118	118	118	117	109	100
August	...	118	118	118	117	109	100
September	...	118	118	118	118	109	100
October	...	118	118	118	118	109	103
November	...	118	118	118	118	109	104
December	...	118	118	118	118	112	105

This Machine LOOKS TO THE FUTURE

Illustration shows standard *American* V-1½-4 ton Vertical Hydraulic Press tooled for broaching four wrench slots simultaneously in a time fuse. The slide on which the fixture is mounted is interlocked with the machine controls. Rate of production is 200 parts per hour with fine finish. This is just one example of the many types of jobs performed by this versatile machine.

THIS standard *American* V-1½-4 ton Vertical Hydraulic Press greatly simplifies reconversion and makes possible worthwhile savings in equipment and re-tooling costs. It is capable of performing a large variety of work and is easily and economically changed over from one job to the next.

American engineers have developed several such versatile standard machines. One or more will undoubtedly fit into your present or future operations. When planning new production, be sure you get *American's* recommendation. There is no obligation. It is part of *American's* complete broaching service—machines, tools, and engineering. Write today for details.

To prevent misalignment and tool damage, use proper fitting pull heads with your broaching tools.

MEMBER BROACHING TOOL INSTITUTE

American BROACH AND MACHINE CO.

ANN ARBOR, MICHIGAN

•

BROACHING MACHINES
PRESSES
BROACHING TOOLS
SPECIAL MACHINERY

DIVISION OF

NON-FERROUS METALS

. . . News and Market Activities

Zinc, Cadmium, Bismuth In Good Supply Now

New York

• • • **Orders restricting** the use of zinc, cadmium and bismuth were withdrawn this week by OPA, which permits these metals to be used for all applications.

Zinc producers point to a large zinc stockpile and report the metal to be practically running out of their ears. Consumers apparently have recognized that ample supplies are available and are reported ordering on a very short term basis. Nor is order volume believed to be reaching even relatively low recent rates.

Cadmium and bismuth were until recently in very straightened supply, but apparently contract cancellations have relieved the urgency of their need. Now that the war has been terminated, there is little likelihood that any of these metals will be inadequate to accommodate civilian demand.

•

Authorize Civilian Use Of Alloying Agents

Washington

• • • **The War Production** Board has revoked restrictions on ferro-columbium, tungsten and molybdenum wire chromium and chrome metal, and nickel and nickel alloy products, formerly controlled by Order M-21 as Directions 5 to 8, respectively.

•

Magnesium Shipments Drop Sharply in June

Washington

• • • **Cutbacks in aircraft** production were reflected in a marked decrease in shipments of magnesium semi-fabricated products during June, according to information released by the Aluminum and Magnesium Div., WPB.

Sand castings shipments fell to 4,878,000 lb, decreasing 20 pct from the previous month, while permanent mold castings dropped to 429,000 lb, 18 pct lower than May. Deliveries of forgings fell 55 pct to 22,000 lb, and extrusions shipments of 257,000 lb were 17 pct lower than the preceding month.

Primary metal production of 6,873,000 lb, was 7 pct higher than the previous month, reflecting for the first time the increased production program authorized by WPB and required for non-aircraft demands.

These figures on fabricated products do not cover incendiary bomb body castings, extruded sheet stock and forging stock, and sticks.

•

Midwestern Aluminum Scrap Market Firm

New York

• • • **Eastern ingot** producers are universally out of the market for aluminum scrap and consequently the market prices quoted for this commodity are purely nominal here and do not reflect transactions.

However, it has been learned that midwestern producers are still in the market for aluminum scrap and are, in fact, paying prices quoted. While aluminum remains in excess, it is of course hard to predict how long this midwestern market will continue.

•

Copper Consumption Still Continues Good

New York

• • • **Copper producers** and brass mills are reported to be in a state of confusion in awaiting a ruling from Washington on the status of copper purchased by the mills as long as two to three weeks ago against military orders but not yet having gone into the mill production line. There has been no ruling as to whether this copper would be taken by government for stockpiling or whether it will eventually be thrown back on the mill and perhaps on copper producers.

Meanwhile, producers are said to be accepting orders only when they are assured that they are firm and based on peacetime requirements not subject to cancellation. Copper producers say that such orders continue to come in in fair volume for September delivery and that consumption during that month should equal or even exceed domestic production.

Producers Consider Premium Position

New York

• • • **Metal producers** here are giving some thought to the position of the government in making premium payments for production of metals by marginal producers where the stockpile is growing beyond the needs of any foreseeable emergency, particularly when such metals have been released from government control and are or may soon be in excess of unrestricted civilian demand.

Producers point out that the premium payment subsidy does not expire until June 30, 1946. The president announced at the time of the enactment of this legislation that he would give consideration to curtailment of premium payments when not needed but action prior to that date would require congressional action.

•

Foreign Purchases Of Lead Are Studied

New York

• • • **WPB officials** are reported to be studying their authority to continue foreign purchases of lead now that the war is over. Should they find that the government is not permitted by law to continue foreign purchases, it would seem necessary to continue restricting use under Orders M-38 and M-384 since private industry would not be able to resume imports under a ceiling price of 6½¢ per lb. Should the government be empowered to continue foreign purchases, it may be expected that the control order will be dropped at once and unrestricted consumption of lead be authorized.

•

Price Controls Revoked

New York

• • • **Price controls** on aluminum, magnesium and mercury have been revoked this week by the Office of Price Administration. In announcing the freeing of these metals for normal market fluctuations, the OPA advised that ample supplies were available to meet all requirements.

Primary Metals

(Cents per lb., unless otherwise noted)

Aluminum, 99+%, del'd (Min. 10,000 lb.)	15.00
Antimony, American, Laredo, Tex.	14.50
Beryllium copper, 3.75-4.25% Be; dollars per lb. contained Be	$17.00
Cadmium, del'd	90.00
Cobalt, 97-99% (per lb.)	$1.50 to $1.57
Copper, electro, Conn. valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$3.00
Iridium, dollars per troy oz.	$120.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9 + %, carlots	20.50
Magnesium, 12-in. sticks, carlots	27.50
Mercury, dollars per 76-lb. flask, f.o.b. New York	$125.00 to $128.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.65

Remelted Metals

(Cents per lb. unless otherwise noted)

Aluminum, No. 12 Fdy. (No. 2)	9.00 to 10.00
Aluminum, deoxidizing No. 2, 3, 4	$6.00 to 9.50
Brass Ingot	
85-5-5-5 (No. 115)	13.25
88-10-2 (No. 215)	16.75
80-10-10 (No. 305)	16.00
No. 1 Yellow (No. 405)	10.25

Copper, Copper Base Alloys

(Mill base, cents per lb.)

	Extruded Shapes	Rods	Sheets
Copper	20.37	....	20.37
Copper, H.R.	....	17.37	....
Copper drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercial bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	....

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier: 2S and 3S, 21.2c.; 52s, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness: 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base, 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 23c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals: ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 34c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths, 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NONFERROUS SCRAP METAL QUOTATIONS

†(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums—other prices are current quotations)

Copper, Copper Base Alloys

OPA Group 1†

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2†

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.00
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25
Automobile radiators	7.00
Zincy bronze borings	8.00
Zincy bronze solids	8.00

OPA Group 3†

Fired rifle shells	8.25
Brass pipe	7.50
Old rolled brass	7.00
Admiralty condenser tubes	7.50
Muntz metal condenser tubes	7.00
Plated brass sheet, pipe reflectors	6.50
Manganese bronze solids	7.25[1]
Manganese bronze solids	6.25[2]
Manganese bronze borings	6.50[1]

OPA Group 4†

Refinery brass	4.75*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Other Copper Alloys

Briquetted Cartridge Brass Turnings	8.625
Cartridge Brass Turnings, Loose	7.875
Loose Yellow Brass Trimmings	7.875

Aluminum

Plant scrap, segregated

2S solids	8.00
Dural alloys, solids 14, 17, 18, 24S 25S	4.50
turnings, dry basis	3.00
Low copper alloys 51, 52, 61, 63S solids	7.50
turnings, dry basis	5.75

Plant scrap, mixed

Solids	4.00
Turnings, dry basis	2.75

Obsolete scrap

Pure cable	8.00
Old sheet and utensils	6.00
Old castings and forgings	5.00
Pistons, free of struts	5.00
Pistons, with struts	3.00
Old alloy sheet	5.00

Magnesium*

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	1.50

Mixed, contaminated plant scrap

Grade 1 solids	3.00
Grade 1 borings and turnings	2.00
Grade 2 solids	2.00
Grade 2 borings and turnings	1.00

*Nominal.

Zinc

New zinc clippings, trimmings	6.50
Engravers, lithographers plates	6.50
Old zinc scrap	4.75
Unsweated zinc dross	5.00
Die cast slab	4.50
New die cast scrap	4.45
Radiator grilles, old and new	3.50
Old die cast scrap	3.00

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead including cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 26c. per lb.; 90 to 98% Ni, 26c. per lb contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	25½
Electrodeposited	18⅞
Rolled, oval, straight	19½
Curved	20⅝
Brass, 80-20, frt. allowed	
Cast, oval, 15 in. or longer	23½
Zinc, cast, 99.99, 15 in. or longer	16¼
Nickel, 99 per cent plus, frt. allowed	
Cast	47
Rolled, depolarized	48
Silver, 999 fine	
Rolled, 1-9 troy oz., per oz.	53*

Chemicals

(Cents per lb., f.o.b. shipping point)

Copper cyanide, 1-5 bbls.	34.00
Copper sulphate, 99.5, crystals, bbls.	7.75
Nickel salts, single, 425 lb. bbls., frt. allowed	13.50
Silver cyanide, 100 oz. lots	—.4175
Sodium cyanide, 96 per cent, domestic, 100 lb. drums	15.00
Zinc cyanide, 100 lb. drums	33.00
Zinc sulphate, 89 per cent, crystals, bbls., frt. allowed	6.35

*Price based on use of foreign silver.

SCRAP

. . . News and Market Activities

Market Strong; Scrap Scarce Everywhere

New York

• • • Contrary to widespread expectations in the market last week, there was considerable feeling of strength in the scrap market this week with all factors apparently confident that the supply of all grades of scrap would be limited for some little time and that demand would continue effective.

While there was little indication of the placing of large new contracts, except from Buffalo where the leading consumer is said to have placed new orders for 10,000 tons at the ceiling and re-instated overdue contracts for more than 5000 tons, consumers have been expanding the tonnages authorized on existing contracts. This move is obviously calculated to obtain scrap without setting the market at ceilings by placing new contracts.

Movement of scrap is continuing at a very low rate in most districts. This is obviously due to the shortage of yard labor and the inability of the trade to continue all facilities on an active basis during the low ebb in scrap prices late last year.

It is reasonable to assume that there may be some modification of the trend of the market not too far in the future. This is the obvious long term result of the cancellation of war contracts for steel products. Nevertheless, the strength of the market this week offers conclusive proof that this development need not be anticipated within the immediate future.

•

CHICAGO—The market remains dormant with no new orders to indicate revision of price levels. Scrap arising from contract terminations under Army jurisdiction is moving slowly due to difficulty in obtaining release on shipment, brokers report.

•

PITTSBURGH—The district market, while very inactive, has an ominous undertone. Prices are holding firmly at ceilings except machine shop turnings which broke to a $14.00 to $15.00 spread this week, but the lack of new business may be enough to break prices in other grades within a few weeks. There was some new business and some reinstated business this week but the total tonnages involved were picayune. Unprepared movement is very low, with very little coming out from contract termination. This is mainly because most companies are still in the process of termination and the scrap is not moving heavily yet. In fact, there is hardly enough from this source to establish a price. However, with an easing in machine shop turnings, buyers may hesitate to buy other grades fearing a drop in the market, and by so doing actually break existing prices.

•

PHILADELPHIA—There has been some purchasing at ceiling prices on the part of one large mill in this district although local mills have not as yet placed any new orders. It is expected that some consumers will return during the week. Mills are putting some pressure on suppliers for faster shipments on old orders. The demand for cast grades from steel mills is still strong. One large foundry, after being out of the district market for some time, has asked for some cast scrap, indicating a return to production in its district plant.

•

DETROIT—Prices continued at ceilings here this week without any evidence of weakness in scrap market.

•

BUFFALO—Any lingering doubts regarding the near term outlook for the local scrap market were removed this week by the leading consumer. This interest reinstated overdue contracts for more than 5000 tons of openhearth material which had been canceled following Japan's capitulation and also placed new orders for 10,000 tons at the ceilings. Although little or no turnings was included in this business, dealers still have orders on their books for this class of scrap at maximum prices. While the steel rate has dropped to 71 pct, mills are anticipating a pickup by building up reserves at this time. Rail shipments continue from the East, a shipload of 5000 tons arrived from the Lakehead and another cargo is due shortly. Electric furnaces are buying an occasional car paying the top figure and no easing of the cast iron market is indicated.

•

CLEVELAND—While the has been no buying activity in scrap in this area to speak of since V-J day, prices are continuing fairly strong. Aside from unprepared scrap and machine shop turnings, all prices are still at ceiling. High labor costs and insufficient help at scrap yards have long kept the unprepared price fairly weak. The purchase this week in Pittsburgh, for the Valley, of a relatively small amount of openhearth scrap at ceiling plus $1.00 springboard interests Cleveland dealers, because any scrap that is shipped to the Valley from Cleveland on this order will be at about 16c a ton under the ceiling. While dealers are anticipating a drop in prices in this area before long, there is now no distress scrap available and some dealers are having difficulties in filling back orders.

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NEW YORK—Scrap continues to move very slowly in this area and new contracts were placed last week at ceiling levels. In view of this development and reports of strength from other market districts, there would seem to be little likelihood of an immediate decline from ceilings in view of the scrap shortage, poor yard labor supply, and limited consumer inventories. Some consumers in this area have been extending existing ceiling contracts for additional tonnage rather than to place new orders at this time.

•

BOSTON—Brokers are still sitting on the sidelines waiting for that something to develop. Business is confined to an occasional carlot left over on old steel mill orders and to truckloads to foundries. Prevailing ceiling prices are purely nominal. Yards report the labor situation even tighter than before the Japanese surrendered. Railroads have plenty of cars for which there is no demand.

•

BIRMINGHAM—Scrap consumers in this market are following a very cautious attitude in buying and about the only material currently going to mills is moving on old orders. No prices are being quoted pending further developments.

•

CINCINNATI—With the sharp diminution since the surrender of Japan, the market in this area has an underlying softness but this has not established any reduction in current quotations. With report of the high civilian demand for all types of iron and steel products, dealers and brokers anticipate a very heavy demand for all types of scrap as soon as the reconversion program gets under way smoothly. Currently dealers and brokers are watchfully waiting for the trend of events.

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Luria Bros. Opens Chemical Laboratory

Reading, Pa.

• • • A chemical laboratory has been established at the yard of Luria Brothers & Co. here in order to analyze ferrous and nonferrous scrap samples mailed by air from all branch offices.

This move which is believed to be unique in scrap circles will permit Luria to guarantee scrap shipments to customers.

Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages (for ceiling prices see O. P. A. schedule No. 4). Where ceiling prices are quoted they do not include brokerage fee or adjusted transportation charges. Asterisks indicate grades selling at ceilings.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00*
RR. hvy. melting	21.00*
No. 2 hvy. melting	20.00*
RR. scrap rails	21.50*
Rails 3 ft. and under	23.50*
No. 1 comp'd sheets	20.00*
Hand bdld. new shts.	20.00*
Hvy. axle turn.	19.50*
Hvy. steel forge turn.	19.50*
Mach. shop turn.	14.00 to 15.00
Short shov. turn.	17.00*
Mixed bor. and turn.	15.00*
Cast iron borings	16.00*
Hvy. break cast.	16.50*
No. 1 cupola	20.00*
RR. knuck. and coup.	24.50*
RR. coil springs	24.50*
Rail leaf springs	24.50*
Rolled steel wheels	24.50*
Low phos. bil. crops	25.00*
Low phos.	22.50*
RR. malleable	22.00*

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75*
No. 2 hvy. melting	18.75*
No. 1 bundles	18.75*
No. 2 dealers' bndls.	18.75*
Bundled mach. shop turn.	18.75*
Galv. bundles	16.75*
Mach. shop turn.	13.75*
Short shovel, turn.	15.75*
Cast iron borings	14.75*
Mix. borings & turn.	13.75*
Low phos. hvy. forge	23.75*
Low phos. plates	21.25*
No. 1 RR. hvy. melt.	19.75*
Reroll rails	22.25*
Miscellaneous rails	20.25*
Rails 3 ft. and under	22.25*
Locomotive tires, cut	22.75 to 23.25
Cut bolsters & side frames	20.25 to 21.25
Angles & splice bars	22.25*
Standard stl. car axles	25.00 to 25.50
No. 3 steel wheels	23.25*
Couplers & knuckles	23.25*
Agricul. malleable	22.00*
RR. malleable	22.00*
No. 1 mach. cast.	20.00*
No. 1 agricul. cast.	20.00*
Hvy. breakable cast.	16.50*
RR. grate bars	15.25*
Cast iron brake shoes	15.25*
Stove plate	19.00*
Clean auto cast.	20.00*
Cast iron carwheels	20.00*

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
No. 1 bundles	19.50*
No. 2 bundles	19.50*
Mach. shop turn.	$10.50 to 11.00
Shoveling turn.	12.50 to 13.00
Cast iron borings	11.50 to 12.00
Mixed bor. & turn.	11.50 to 12.00
Low phos. plate	22.00*
No. 1 cupola cast.	20.00*
Hvy. breakable cast.	16.50*
Stove plate	19.00*
Scrap rails	21.00*

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting	$15.05*
No. 2 hvy. melting	15.05*
No. 1 and 2 bundles	15.05*
Busheling	15.05*
Turnings, shovelings	12.05*
Machine shop turn.	10.05*
Mixed bor. & turn.	10.05*
Cl'n cast, chem. bor.	13.06 to 14.15*
Truck delivery to foundry	
Machinery cast.	21.00 to 23.51*
Breakable cast	21.57 to 21.87*
Stove plate	20.00 to 23.51*

DETROIT

Per gross ton, brokers' buying prices:

No. 1 hvy. melting	$17.32*
No. 2 hvy. melting	17.32*
No. 1 bundles	17.32*
New busheling	17.32*
Flashings	17.32*
Mach. shop turn.	12.32*
Short shov. turn.	14.32*
Cast iron borings	13.32*
Mixed bor. & turn.	12.32*
Low phos. plate	19.82*
No. 1 cupola cast.	20.00*
Charging box cast.	19.00*
Hvy. breakable cast.	16.50*
Stove plate	19.00*
Automotive cast	20.00*

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75*
No. 2 hvy. melting	18.75*
No. 2 bundles	18.75*
Mach. shop turn.	13.75*
Shoveling turn.	15.75*
Cast iron borings	13.50 to 14.00
Mixed bor. & turn.	13.75*
No. 1 cupola cast	20.00*
Hvy. breakable cast	16.50*
Cast, charging box	19.00*
Hvy. axle forge turn.	18.25*
Low phos. plate	21.25*
Low phos. punchings	21.25*
Billet crops	21.25*
RR. steel wheels	23.25*
RR. coil springs	23.25*
RR. malleable	22.00*

ST. LOUIS

Per gross ton delivered to consumer:

Heavy melting	$17.50*
Bundled sheets	17.50*
Mach. shop turn.	11.25 to 11.75
Locomotive tires, uncut	18.00
Misc. std. sec. rails	19.00*
Rerolling rails	21.00*
Steel angle bars	21.00*
Rails 3 ft. and under	21.50*
RR. springs	22.00*
Steel car axles	23.50*
Stove plate	19.00*
Grate bars	15.25*
Brake shoes	15.25*
RR. malleable	22.00*
Cast iron carwheels	20.00*
No. 1 mach'ery cast	20.00*
Breakable cast	16.50*

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$17.00*
No. 2 hvy. melting	17.00*
No. 2 bundles	17.00*
No. 1 busheling	17.00*
Long turnings	$9.50 to 10.00
Cast iron borings	10.50 to 11.00
Bar crops and plate	19.50*
Structural and plate	19.50*
No. 1 cast	20.00*
Stove plate	17.00
Steel axles	18.00*
Scrap rails	18.50
Rerolling rails	20.50*
Angles & splice bars	20.50*
Rails 3 ft. & under	21.00*
Cast iron carwheels	16.50 to 17.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00*
No. 2 hvy. melting	20.00*
Low phos. plate	22.50*
No. 1 busheling	20.00*
Hydraulic bundles	20.00*
Mach. shop. turn.	15.00*
Short shovel. turn.	17.00*
Cast iron borings	16.00*

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$15.33*
No. 2 hvy. melting	15.33*
Comp. black bundles	15.33*
Comp. galv. bundles	13.33*
Mach. shop turn.	10.33*
Mixed bor. & turn.	10.33*
Shoveling turn.	12.33*
No. 1 cupola cast	20.00*
Hvy. breakable cast	16.50*
Charging box cast	19.00*
Stove plate	19.00*
Clean auto cast.	20.00*
Unstrip. motor blks.	17.50*
Cl'n chem. cast bor.	14.33*

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.25*
No. 1 bundles	19.25*
No. 2 bundles	19.25*
No. 2 hvy. melting	19.25*
Mach. shop turn.	14.25*
Shoveling turn.	16.25*
Cast iron borings	15.25*
Mixed bor. & turn.	14.25*
No. 1 cupola cast.	20.00*
Stove plate	19.00*
Low phos. plate	21.75*
Scrap rails	20.75*
Rails 3 ft. & under	22.75*
RR. steel wheels	23.75*
Cast iron car wheels	20.00*
RR. coil & leaf spgs.	23.75*
RR. knuckles & coup.	23.75*
RR. malleable	22.00*
No. 1 busheling	19.25*

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
Compressed sheet stl.	19.50*
Drop forge flashings	19.00*
No. 2 bundles	19.50*
Mach. shop turn.	14.50*
Short shovel.	16.50*
No. 1 busheling	19.50*
Steel axle turn.	19.00*
Low phos. billet and bloom crops	24.50*
Cast iron borings	15.50*
Mixed bor. & turn.	14.50*
No. 2 busheling	17.00*
No. 1 machine cast	20.00*
Railroad cast	20.00*
Railroad grate bars	15.25*
Stove plate	19.00*
RR. hvy. melting	20.50*
Rails 3 ft. & under	23.00*
Rails 18 in. & under	24.25*
Rails for rerolling	23.00*
Railroad malleable	22.00*
Elec. furnace punch	22.00*

SAN FRANCISCO

Per gross ton delivered to consumer:

RR. hvy. melting	$16.50
No. 1 hvy. melting	16.50
No. 2 hvy. melting	15.00
No. 2 bales	$13.50 to 14.25
No. 3 bales	9.50 to 10.59
Mach. shop turn.	7.00
Elec. furn. 1 ft., und.	15.50 to 17.00
No. 1 cupola cast.	19.00 to 21.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	$14.50 to $15.50
No. 2 hvy. melting	13.50 to 14.50
No. 2 bales	12.50 to 13.50
No. 3 bales	9.00 to 10.00
Mach. shop turn.	4.50
No. 1 cupola cast.	19.00 to 21.00

SEATTLE

Per gross ton delivered to consumer:

RR. hvy. melting	$14.50
No. 1 hvy. melting	14.50*
No. 3 bundles	11.50
Elec. furn. 1 ft., und.	17.00
No. 1 cupola cast.	20.00*

Comparison of Prices . .

Advances over past week in **Heavy Type**; declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-Rolled Steel: (cents per pound)	Aug. 28, 1945	Aug. 21, 1945	July 24, 1945	Aug. 29, 1944
Hot-rolled sheets	2.20	2.20	2.20	2.10
Cold-rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.70	3.70	3.70	3.50
Hot-rolled strip	2.10	2.10	2.10	2.10
Cold-rolled strip	2.80	2.80	2.80	2.80
Plates	2.25	2.25	2.25	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terneplate: (dollars per base box)				
Tinplate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tinplate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (cents per pound)				
Merchant bars	2.25	2.25	2.25	2.15
Cold-finished bars	2.75	2.75	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (cents per pound)				
Bright wire	2.75	2.75	2.75	2.60
Wire nails	2.90	2.90	2.90	2.55
Rails: (dollars per gross ton)				
Heavy rails	$43.00	$43.00	$43.00	$40.00
Light rails	45.00	45.00	45.00	40.00
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$36.00	$36.00	$36.00	$34.00
Sheet bars	36.00	36.00	36.00	34.00
Slabs, rerolling	36.00	36.00	36.00	34.00
Forging billets	42.00	42.00	42.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (cents per pound)				
Wire rods	2.15	2.15	2.15	2.00
Skelp	1.90	1.90	1.90	1.90

Pig Iron: (per gross ton)	Aug. 28, 1945	Aug. 21, 1945	July 24, 1945	Aug. 29, 1944
No. 2 foundry, Phila.	$26.84	$26.84	$26.84	$25.84
No. 2, Valley furnace	25.00	25.00	25.00	24.00
No. 2, Southern, Cin'ti	25.44	25.44	25.44	24.44
No. 2, Birmingham	21.38	21.38	21.38	20.38
No. 2 foundry, Chicago†	25.00	25.00	25.00	24.00
Basic, del'd eastern Pa.	26.34	26.34	26.34	25.34
Basic, Valley furnace	24.50	24.50	24.50	23.50
Malleable, Chicago†	25.00	25.00	25.00	24.00
Malleable, Valley	25.00	25.00	25.00	24.00
L. S. charcoal, Chicago	42.34	42.34	42.34	37.34
Ferromanganese‡	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is 60¢ per ton.
‡ For carlots at seaboard.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.32	17.32	17.32	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Chicago	20.00	20.00	20.00	20.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$7.50	$7.50	$7.50	$7.00
Foundry coke, prompt	9.00	9.00	9.00	8.25
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00
Tin, Straits, New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, virgin, del'd	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	14.50	14.50	14.50	14.50

Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942 and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943 issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite prices for the current quarter are an estimate based on finished steel shipments for the previous quarter. These figures will be revised when the actual data of shipments for this quarter are compiled.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Aug. 28, 1945	2.41571¢ a pound	$24.61 a gross ton	$19.17 a gross ton
One week ago	2.41571¢ a pound	$24.61 a gross ton	$19.17 a gross ton
One month ago	2.41571¢ a pound	$24.61 a gross ton	$19.17 a gross ton
One year ago	2.30837¢ a pound	$23.61 a gross ton	$19.17 a gross ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1945	2.41571¢ May 29	2.21189¢ Jan. 2	$24.61 Feb. 20	$23.61 Jan. 2	$19.17	$19.17
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5	$23.61	$23.61	19.17	$15.67 Oct. 24
1943	2.25513¢	2.25513¢	23.61	23.61	19.17	$19.17
1942	2.26190¢	2.26190¢	23.61	23.61	19.17	$19.17
1941	2.43078¢	2.43078¢	$23.61 Mar. 20	$23.45 Jan. 2	$22.00 Jan. 7	$19.17 Apr. 10
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16	23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
1939	2.35367¢ Jan. 3	2.26689¢ May 16	22.61 Sept. 19	20.61 Sept. 12	22.50 Oct. 3	14.08 May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18	23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4	23.25 Mar. 9	20.25 Feb. 16	21.92 Mar. 30	12.67 June 8
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10	19.74 Nov. 24	18.73 Aug. 11	17.75 Dec. 21	12.67 June 9
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8	18.84 Nov. 5	17.83 May 14	13.42 Dec. 10	10.33 Apr. 29
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2	17.90 May 1	16.90 Jan. 27	13.00 Mar. 13	9.50 Sept. 25
1933	1.95578¢ Oct. 3	1.75836¢ May 2	16.90 Dec. 5	13.56 Jan. 3	12.25 Aug. 8	6.75 Jan. 3
1932	1.89196¢ July 5	1,83901¢ Mar. 1	14.81 Jan. 5	13.56 Dec. 6	8.50 Jan. 12	6.43 July 5
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29	15.90 Jan. 6	14.79 Dec. 15	11.33 Jan. 6	8.50 Dec. 29
1930	2.25488¢ Jan. 7	1.97319¢ Dec. 9	18.21 Jan. 7	15.90 Dec. 16	15.00 Feb. 18	11.25 Dec. 9
1929	2.31773¢ May 28	2.26498¢ Oct. 29	18.71 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 3

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 pct of the United States output. Index recapitulated in Aug. 28, 1941 issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

. . . Prices of Finished Iron and Steel

Steel prices shown here are f.o.b. basing points, in cents per pound unless otherwise indicated. Extras apply. Delivered prices do not reflect 3 pct tax on freight. (1) Mill run sheet, 10¢ per 100 lb under base; primes, 25¢ above base. (2) Unassorted commercial coating. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25¢ per 100 lb to fabricators. (8) Also shafting. For quantities of 20,000 to 39,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (11) Boxed. (12) This base price for annealed, bright finish wires, commercial spring wire. (13) Produced to dimensional tolerances in AISI Manual Sect. 6. For price exceptions to finished and semi-finished steels turn several pages.

Basing Points	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown Ohio	Gulf Ports, Cars	Pacific Ports, Cars [10]	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot-rolled	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.30¢	2.20¢		2.75¢	2.30¢	2.44¢	2.37¢
Cold-rolled [1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.29¢	3.37¢
Galvanized (24 gage)	3.70¢	3.70¢	3.70¢		3.70¢	3.70¢	3.70¢	3.70¢	3.80¢	3.70¢		4.25¢		3.94¢	3.87¢
Enameling (20 gage)	3.45¢	3.45¢	3.45¢	3.45¢			3.45¢		3.55¢	3.45¢		4.10¢	3.55¢	3.81¢	3.77¢
Long ternes [2]	3.80¢	3.80¢	3.80¢									4.55¢		4.16¢	4.12¢
STRIP															
Hot-rolled [3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.30¢	2.46¢	
Cold-rolled [4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester=3.00¢)					2.90¢	3.16¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity cold-rolled	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester=3.35¢)					3.05¢	3.31¢	
TINPLATE															
Standard cokes, base box	$5.00	$5.00	$5.00						$5.10					5.36¢	5.32¢
Electro, box {0.25 lb	$4.35	$4.35	$4.35												
Electro, box {0.50 lb	$4.50	$4.50	$4.50						$4.60						
Electro, box {0.75 lb	$4.65		$4.65						$4.75						
BLACKPLATE															
29 gage [5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ [11]			3.37¢
TERNES, MFG.															
Special coated, base box	$4.30	$4.30	$4.30						$4.40						
BARS															
Carbon steel	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢		(Duluth=2.35¢)			2.60¢	2.90¢	2.35¢	2.59¢	2.57¢
Rail steel [6]	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢					2.60¢	2.90¢			
Reinforcing (billet) [7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢	2.39¢	
Reinforcing (rail) [7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	2.55¢	2.25¢		2.47¢
Cold-finished [8]	2.75¢	2.75¢	2.75¢	2.75¢		2.75¢		(Detroit=2.80¢)			(Toledo=2.90¢)			3.09¢	3.07¢
Alloy, hot-rolled	2.70¢	2.70¢				2.70¢		(Bethlehem, Massillon, Canton=2.70¢)					2.80¢		
Alloy, cold-drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
PLATES								(Coatesville and Claymont=2.25¢)							
Carbon steel [13]	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢		2.25¢	2.25¢			2.60¢	2.80¢	2.47¢	2.44¢	2.30¢
Floor plates	3.50¢	3.50¢									3.85¢	4.15¢		3.86¢	3.82¢
Alloy	3.50¢	3.50¢			(Coatesville=3.50¢)						3.95¢	4.15¢		3.70¢	3.69¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem=2.10¢)			2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R															
0.26 to 0.50 carbon	2.80¢			2.80¢				(Worcester=3.00¢)							
0.51 to 0.75 carbon	4.30¢			4.30¢				(Worcester=4.50¢)							
0.76 to 1.00 carbon	6.15¢			6.15¢				(Worcester=6.35¢)							
1.01 to 1.25 carbon	8.35¢			8.35¢				(Worcester=8.55¢)							
WIRE [9]															
Bright [12]	2.75¢	2.75¢		2.75¢	2.75¢		(Worcester=2.85¢)		(Duluth=2.80¢)			3.25¢			3.07¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire base														
Spring (high carbon)	3.35¢	3.35¢		3.35¢			(Worcester=3.45¢)					3.85¢			3.67¢
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

SEMIFINISHED STEEL

Ingots, Carbon, Rerolling

Base per gross ton, f.o.b. mill.... $31.00

Ingots, Carbon, Forging

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown $36.00

Ingots, Alloy

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Coatesville, Chicago, Massillon, Pittsburgh $45.00

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; delivered E. Michigan, $3.00 higher; f.o.b. Duluth, billets only, $2.00 higher; billets f.o.b. Pacific ports are $12.00 higher. Provo, $11.20 higher. Delivered prices do not reflect 3 pct tax on freight rates.

	Per Gross Ton
Rerolling	$36.00
Forging	42.00

Alloy Billets, Blooms, Slabs

Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem, per gross ton $54.00

Price delivered Detroit $2.00 higher; East Michigan, $3.00 higher.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point.

	Per Gross Ton
Openhearth or bessemer	$36.00

PRICES

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)

	Per Lb.
Pittsburgh, Chicago, Cleveland	2.15c.
Worcester, Mass.	2.25c.
Birmingham	2.15c.
San Francisco	2.65c.
Galveston	2.40c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

Shell Steel

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher; East Michigan, $3 higher.

Price Exceptions: Follansbee Steel Corp. permitted to sell at $13.00 per gross ton, f.o.b. Toronto, Ohio, above base price of $52.00.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

RAILS, TRACK SUPPLIES

(F.o.b. Mill)

Standard rails, heavier than 60 lb., No. 1 O.H., gross ton	$43.00
Angle splice bars, 100 lb.	2.70
(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$45.00
Light rails (from rail steel)	44.00
	Base per Lb.
Cut spikes	3.25c.
Screw spikes	5.40c.
Tie plate, steel	2.30c.
Tie plates, Pacific Coast	2.45c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 5c. higher.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	*Pacific Coast Basing Points†*
	Base per Keg	
Standard wire nails	$2.90	$3.40
Coated nails	2.90	3.40
Cut nails, carloads	3.85	....
	Base per 100 Lb.	
Annealed fence wire	$3.05	$3.55
Annealed galv. fence wire	3.40	3.90
	Base Column	
Woven wire fence*	67	85
Fence posts, carloads	69	86
Single loop bale ties	66	91
Galvanized barbed wire**	72	82
Twisted barbless wire	72	....

*15½ gage and heavier. **On 80-rod spools in carload quantities.

†Prices subject to switching or transportation charges.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendment to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-45 Ann.
**Philadelphia	$3.518	$4.872§	$4.768a	$3.922	$4.772	$3.805	$3.668	$3.822	$4.172	$5.816	$6.866	$7.072	$8.172
New York	3.59	4.613[2]	5.110	3.974[6]	4.772	3.768	3.758	3.853	4.203	5.858	6.908	7.103	8.203
Boston	3.744	4.744[9]	5.224[9]	4.106	4.715	3.912	3.912	4.044	4.244	6.012	7.062	7.194	8.394
Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.152	....	....	....	....
Norfolk	3.771	4.965	5.371	4.165	4.965	3.971	4.002	4.065	4.265	....	....	....	....
Chicago	3.25	4.20	5.231	3.60	4.85[17]	3.55	3.55	3.50	3.85	5.80	6.85	6.85	7.90
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.787[17]	3.587	3.587	3.637	3.987	5.837	6.887	6.887	7.987
Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.85	5.808	6.858	6.85	7.75
Buffalo	3.35	4.40	4.754	3.819	4.669	3.63	3.40	3.35	3.85	5.80	6.85	6.85	7.75
Detroit	3.45	4.50	5.004	3.70	4.859[17]	3.609	3.681	3.45	3.90	5.93	6.98	6.959	8.059
Cincinnati	3.425	4.475[3]	4.825[5]	3.675	4.711	3.681	3.691	3.611	4.111	5.95	7.00	7.011	8.261
St. Louis	3.397	4.347[3]	5.172[4]	3.747	4.931[17]	3.697	3.697	3.647	4.131	5.981	7.031	7.031	8.131
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.85	5.80	6.85	6.85	7.90
St. Paul	3.59	4.46	5.257[4]	3.88	5.102[17]	3.813[3]	3.813[3]	3.763[3]	3.461	5.94	5.99	7.361	8.461
Omaha	3.865	5.443	5.608[4]	4.215	....	4.165	4.165	4.115	4.543	....	....	....	....
Indianapolis	3.518	4.568	4.548	3.768	4.741	3.63	3.63	3.58	4.00	5.93	6.98	6.98	8.23
Birmingham	3.45	....	4.75	3.70	....	3.55	3.55	3.50	4.53	....	....	....	....
Memphis	3.965[7]	4.66	5.265	4.215	....	4.065	4.065	4.015	4.33	....	....	....	....
New Orleans	4.058*	5.079	5.358	4.308	....	4.158	4.158*	4.108*	4.729	....	....	....	....
Houston	3.763	5.573	6.313[1]	4.313	....	4.25	4.25	3.75	6.473[3]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.20[3]	6.10[4]	4.95	5.813[15]	4.95	4.95	4.40	5.583	8.204	9.404	9.304	10.454
San Francisco	4.55[14]	7.30[4]	6.35[4]	4.50[14]	7.333[17]	4.85[14]	4.35[14]	4.15[14]	5.433	8.304	9.404	9.404	10.454
Seattle	4.65[12]	7.05[4]	5.95[4]	4.25[12]	....	4.75[12]	4.45[12]	4.35[12]	5.883	....	9.404	....	....
Portland	4.65[11]	6.60[4]	5.75[4]	4.75[11]	....	4.85[11]	4.45[11]	4.45[11]	5.633	8.304	9.404	8.304	9.404
Salt Lake City	4.530[17]	....	6.171[3]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	6.00	....	....	....	....

National Emergency Steels

MILL EXTRAS

Designation	Basic Open-Hearth		Electric Furnace		Designation	Basic Open-Hearth		Electric Furnace	
	Bars and Bar-Strip	Billets, Blooms, and Slabs	Bars and Bar-Strip	Billets, Blooms, and Slabs		Bars and Bar-Strip	Billets, Blooms, and Slabs	Bars and Bar-Strip	Billets, Blooms, and Slabs
NE 8612	0.65¢	$13.00	$1.15	$23.00	NE 9427	0.75¢	$15.00	$1.25	$25.00
NE 8615	0.65	13.00	1.15	23.00	NE 9430	0.75	15.00	1.25	25.00
NE 8617	0.65	13.00	1.15	23.00	NE 9432	0.75	15.00	1.25	25.00
NE 8620	0.65	13.00	1.15	23.00	NE 9435	0.75	15.00	1.25	25.00
NE 8622	0.65	13.00	1.15	23.00	NE 9437	0.75	15.00	1.25	25.00
NE 8625	0.65	13.00	1.15	23.00	NE 9440	0.75	15.00	1.25	25.00
NE 8627	0.65	13.00	1.15	23.00	NE 9442	0.80	16.00	1.30	26.00
NE 8630	0.65	13.00	1.15	23.00	NE 9445	0.80	16.00	1.30	26.00
NE 8632	0.65	13.00	1.15	23.00	NE 9447	0.80	16.00	1.30	26.00
NE 8635	0.65	13.00	1.15	23.00	NE 9450	0.80	16.00	1.30	26.00
NE 8637	0.65	13.00	1.15	23.00					
NE 8640	0.65	13.00	1.15	23.00					
NE 8642	0.65	13.00	1.15	23.00	NE 9722	0.65	13.00	1.15	23.00
NE 8645	0.65	13.00	1.15	23.00	NE 9727	0.65	13.00	1.15	23.00
NE 8647	0.65	13.00	1.15	23.00	NE 9732	0.65	13.00	1.15	23.00
NE 8650	0.65	13.00	1.15	23.00	NE 9737	0.65	13.00	1.15	23.00
					NE 9742	0.65	13.00	1.15	23.00
					NE 9745	0.65	13.00	1.15	23.00
NE 8712	0.70	14.00	1.20	24.00	NE 9747	0.65	13.00	1.15	23.00
NE 8715	0.70	14.00	1.20	24.00	NE 9750	0.65	13.00	1.15	23.00
NE 8717	0.70	14.00	1.20	24.00	NE 9763	0.65	13.00	1.15	23.00
NE 8720	0.70	14.00	1.20	24.00	NE 9768	0.65	13.00	1.15	23.00
NE 8722	0.70	14.00	1.20	24.00					
NE 8725	0.70	14.00	1.20	24.00					
NE 8727	0.70	14.00	1.20	24.00	NE 9830	1.30	28.00	1.80	36.00
NE 8730	0.70	14.00	1.20	24.00	NE 9832	1.30	28.00	1.80	36.00
NE 8732	0.70	14.00	1.20	24.00	NE 9836	1.30	28.00	1.80	36.00
NE 8735	0.70	14.00	1.20	24.00	NE 9837	1.30	28.00	1.80	36.00
NE 8737	0.70	14.00	1.20	24.00	NE 9840	1.30	28.00	1.80	36.00
NE 8740	0.70	14.00	1.20	24.00	NE 9842	1.30	28.00	1.80	36.00
NE 8742	0.70	14.00	1.20	24.00	NE 9845	1.30	28.00	1.80	36.00
NE 8745	0.70	14.00	1.20	24.00	NE 9847	1.30	28.00	1.80	36.00
NE 8747	0.70	14.00	1.20	24.00	NE 9850	1.30	28.00	1.80	36.00
NE 8750	0.70	14.00	1.20	24.00					
					NE 9912	1.20	24.00	1.55	31.00
NE 9415	0.75	15.00	1.25	25.00	NE 9915	1.20	24.00	1.55	31.00
NE 9417	0.75	15.00	1.25	25.00	NE 9917	1.20	24.00	1.55	31.00
NE 9420	0.75	15.00	1.25	25.00	NE 9920	1.20	24.00	1.55	31.00
NE 9422	0.75	15.00	1.25	25.00	NE 9922	1.20	24.00	1.55	31.00
NE 9425	0.75	15.00	1.25	25.00	NE 9925	1.20	24.00	1.55	31.00

Note 1: The ranges shown are restricted to sizes 100 sq. in. or less or equivalent cross-sectional area 18 in. wide or under with a maximum individual piece weight of 7000 lb. irrespective of size. Note 2: For steels ordered to such ranges, below the size and weight restriction, the average of all the chemical checks must be within the limits specified subject to check analysis variations given in Table 4, Section 10, AISI Steel Products Manual. Note 3: When acid open-hearth is specified and acceptable, add to basic open-hearth alloy differential 0.25c. per lb. for bars and bar strip and $5 per gross ton for billets, blooms and slabs. Note 4: The extras shown are in addition to the base price of $2.70 for 100 lb. on finished products and $54 per gross ton on semi-finished steel, major basing points, and are in cents per pound when applicable to bars and bar-strip and in dollars per gross ton when applicable to billets, blooms and slabs. The full extra applicable over the base price is the total of all extras indicated by the specific requirements of the order. The higher extra shall be charged for any size falling between two published extras.

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD ROLLED: Sheets, 400 to 1499 lb.; strip, extras on all quantities; bars, 1500 lb. base.

NE ALLOY BARS: 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 199 lb. (7) 400 to 1499 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb. and over. (15) 1000 lb. and over. (16) 1500 lb. and over. (17) 2000 lb. and over. (18) 3500 lb. and over.

(a) Philadelphia: Galvanized sheet, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

*Add 0.271c. for sizes not rolled in Birmingham.

**City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports**)

	Per Gross Ton
Old range, bessemer, 51.50	$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorus, 51.50	4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

PRICES

WELDED PIPE AND TUBING

Base discounts, f.o.b. Pittsburgh district and Lorain, Ohio, mills

(F.o.b. Pittsburgh only on wrought pipe) base price—$200.00 per net ton

	Black	Galv.
Steel (buttweld)		
⅛-in.	63½	51
¼-in.	66½	55
⅜-in. to 3-in.	68½	57½
Wrought Iron (buttweld)		
⅛-in.	24	3½
¼-in.	30	10
⅜-in. and 1¼-in.	34	16
1½-in.	38	18½
2-in.	37½	18
Steel (lapweld)		
2-in.	61	49½
2½-in. and 3-in.	64	52½
3½-in. to 6-in.	66	54½
Wrought Iron (lapweld)		
2-in.	30½	12
2½-in. to 3½-in.	31½	14½
4-in.	33½	18
4½-in. to 8-in.	32½	17
Steel (butt, extra strong, plain ends)		
⅛-in.	61½	50½
¼-in.	65½	54½
⅜-in. to 3-in.	67	57
Wrought Iron (same as above)		
⅛-in.	25	6
¼-in.	31	12
⅜-in. to 2-in.	38	19½
Steel (lap, extra strong, plain ends)		
2-in.	59	48½
2½-in. and 3-in.	63	52½
3½-in. to 6-in.	66½	56
Wrought Iron (same as above)		
2-in.	33½	15½
2½-in. to 4-in.	39	22½
4½-in. to 6-in.	37½	21

On buttweld and lapweld steel pipe jobbers are granted a discount of 5 pct. On l.c.l. shipments prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lapweld and one point lower discount, or $2 a ton higher on all buttweld.

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger are $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect 3 pct tax on freight rates.

BOILER TUBES

Seamless steel and lapweld commercial boiler tubes and locomotive tubes, Minimum wall. Net base prices per 100 ft f.o.b. Pittsburgh, in carload lots.

	Seamless Cold-Drawn	*Seamless Hot-Rolled*	*Lapweld, Hot-Rolled*
2 in. O.D. 13 B.W.G.	15.03	13.04	12.38
2½ in. O.D. 12 B.W.G.	20.21	17.54	16.58
3 in. O.D. 12 B.W.G.	22.48	19.50	18.35
3½ in. O.D. 11 B.W.G.	28.37	24.62	23.15
4 in. O.D. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb or ft and over	Base
30,000 lb or ft to 39,999 lb or ft	5 pct
20,000 lb or ft to 29,999 lb or ft	10 pct
10,000 lb or ft to 19,999 lb or ft	20 pct
5,000 lb or ft to 9,999 lb or ft	30 pct
2,000 lb or ft or 4,999 lb or ft	45 pct
Under 2,000 lb or ft	65 pct

PRICES

CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

	Per 1000
Super-duty brick, St. Louis	$68.55
First quality, Pa., Md., Ky., Mo., Ill.	54.45
First quality, New Jersey	59.45
Sec. quality, Pa., Md. Ky., Mo., Ill.	49.40
Sec. quality, New Jersey	54.15
No. 1 Ohio	45.75
Ground fire clay, net ton	8.05

Silica Brick

Pennsylvania and Birmingham	$54.45
Chicago District	62.45
Silica cement, net ton (Eastern)	9.55

Chrome Brick

	Per Net Ton
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$54.00

Magnesite Brick

Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$43.45
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

EXCEPTIONS TO RPS 6

Ingots, carbon, rerolling—Phoenix Iron Co. may charge $38.75; Kaiser Co., $43.00 f.o.b. Pacific Coast ports; Empire Sheet & Tinplate Co., $34.25; Pgh. Steel Co., $33.10. Granite City Steel, $39.45.

Ingots, carbon, forging—Phoenix Iron Co. may charge $43.00; Empire Sheet & Tinplate Co., $39.25, f.o.b. Mansfield, Ohio; West Coast producers, $48.00, f.o.b. Pacific Coast Ports; Pgh. Steel Co., $38.10.

Ingots, alloy—C/I delivered Detroit add $2.00; delivered East Michigan add $3.00. Connors Steel Co. may charge $45.00 f.o.b. Birmingham.

Slabs, per gross ton—Andrews Steel Co. $41 basing pts.; Wheeling Steel Corp. (rerolling) 4 in. sq. or larger $37.75 f.o.b. Portsmouth, Ohio; Empire Sheet & Tin Plate Corp. $41; Phoenix Iron Co. (rerolling) $41, (forging) $47; Granite City Steel $47.50; Kaiser Co., (rerolling) $58.64, (forging) $64.64, f.o.b. Los Angeles.

Blooms, per gross ton—Phoenix Iron Co. (rerolling) $41; (forging) $47; Pgh. Steel Co. (rerolling) $38.25, (forging) $44.25; Wheeling Steel Corp. (rerolling) 4 in. sq. or larger $37.75 f.o.b. Portsmouth; Kaiser Co. (rerolling) $58.64, (forging) $64.64 (shell steel) $74.64 f.o.b. Los Angeles.

Sheet Bar, per gross ton—Empire Sheet & Tinplate Co. $39 mill; Wheeling Steel Corp. $38 Portsmouth, Ohio.

Billets, Forging, per gross ton—Andrews Steel Co. $50 basing pts.; Follansbee Steel Corp. $49.50 Toronto, Ohio; Phoenix Iron Co. $47 mill; Geneva Steel Co. $64.64 f.o.b. Pacific Coast; Pittsburgh Steel Co. $49.50, Kaiser Co. $64.64, (shell steel) $74.64, f.o.b. Los Angeles.

PRICES

Billets, Rerolling, per gross ton—Continental Steel Corp. may charge Acme Steel in Chicago switching area $34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) $41 mill; Wheeling Steel Corp. 4 in. sq. or larger $37.75, smaller $39.50 f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at $39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. $41 mill; Continental Steel Corp. (1¾ x 1¾) $39.50, (2 x 2) $40.60 Kokomo, Ind. (these prices include $1 size extra); Keystone Steel & Wire Co. $36.40 Peoria; Connors Steel Co. $50.60 Birmingham; Ford Motor Co. $34 Dearborn, Mich.; Geneva Steel Co. $58.64 f.o.b. Pacific Coast; Pgh. Steel Co. $43.50; Kaiser Co. $58.64 f.o.b. Los Angeles.

Structural Shapes—Phoenix Iron Co. 2.35c. basing pts. (export) 2.50c. Phoenixville; Knoxville Iron Co. 2.30c. basing points; Kaiser Co. 3.20c. f.o.b. Los Angeles.

Rails, per gross ton—Sweet Steel Co. (rail steel) $50 mill; West Virginia Rail Co. (lightweight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron, $45 Pueblo.

Hot Rolled Plate—Granite City Steel Co. 2.35c. produced on DPC eqpt., 2.35c. otherwise; Knoxville Iron Co. 2.25c. basing pts.; Kaiser Co. and Geneva Steel Co. 3.20c. Pacific Ports; Central Iron and Steel Co. 2.50c. basing points; Granite City Steel Co. 2.35c. Granite City.

Merchant Bars—W. Ames Co., 10 tons and over, 2.85c. mill; Eckels-Nye Steel Corp. 2.50c. basing pts. (rail steel) 2.40c.; Phoenix Iron Co. 2.40c. basing pts.; Sweet Steel Co. (rail steel) 2.33c. mill; Joslyn Mfg. & Supply Co., 2.35c. Chicago; Calumet Steel Div., Borg Warner Corp. (8 in. mill bar), 2.35c. Chicago; Knoxville Iron Co., 2.30c. basing pts.; Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.ob Madison, Ill.; Milton Mfg. Co., 2.75c. f.o.b. Milton, Pa.

Pipe Skelp—Wheeling Steel, Benwood, 2.05c.

Reinforcing Bars—W. Ames & Co., 10 tons and over, 2.85c. mill; Sweet Steel Co. (rail steel), 2.33c. mill; Columbia Steel Co., 2.50c. Pacific Ports.

Cold Finished Bars—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New England Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Mansfield, Mass., f.o.b. Mansfield; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants, f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight Buffalo to Readville, Mass., f.o.b. Readville; Medart Co. in certain areas, Chicago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

Alloy Bars—Texas Steel Co., for delivery except Texas and Okla., Chicago base, f.o.b. Fort Worth, Tex.; Connors Steel Co., shipped outside Ala., Mississippi, Louisiana, Georgia, Florida, Tenn., Pittsburgh base, f.o.b. Birmingham.

Hot Rolled Strip—Joslyn Mfg. & Supply Co., 2.30c. Chicago; Knoxville Iron Co., 2.25c. basing pts.

Hot Rolled Sheets—Andrews Steel Co., Middletown base on shipments to Detroit or area; Parkersburg Iron & Steel, 2.25c. Parkersburg. Granite City Steel 2.45c.

Galvanized Sheets—Andrews Steel Co. 3.75c. basing pts.; Parkersburg Iron & Steel Co., 3.85c. Parkersburg; Continental Steel Co., Middletown base on Kokomo, Ind., product; Superior Sheet Steel Co., Pittsburgh base except for Lend-Lease.

Pipe and Tubing—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

Black Sheets—Empire Sheet and Tinplate Co., maximum base price mill is 2.45c. per 100 lb., with differentials, transportation charges, etc., provided in RPS. No. 6.

Wire Products—Pittsburgh Steel Co., f.o.b. Pittsburgh, per 100 lb., rods, No. 5 to 9/32 in., 2.20c.; rods, heavier than 9/32, 2.35c.; bright wire, 2.725c.; bright nails, 2.90c.; lead and furnace annealed wire, 2.85c.; pot annealed wire, 2.85c.; galvanized barbed wire, 3.90c.; plain staples, 2.55c.; galvanized staples, 2.65c.; bright spring wire, 3.30c.; galvanized spring wire, 3.45c.

PIG IRON PRICES

BASING POINT* BASE PRICES

Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	$25.50	$26.00	$26.50	$27.00	.....
Birdsboro	25.50	26.00	26.50	27.00	$30.50
Birmingham	20.00	21.38	.....	26.00	.....
Buffalo	24.00	25.00	25.50	26.00	30.50
Chicago	24.50	25.00	25.00	25.50	.....
Cleveland	24.50	25.00	25.00	25.50	.....
Detroit	24.50	25.00	25.00	25.50	.....
Duluth	25.00	25.50	25.50	26.00	.....
Erie	24.50	25.00	25.50	26.00	.....
Everett	25.50	26.00	26.50	27.00	.....
Granite City	24.50	25.00	25.00	25.50	.....
Hamilton	24.50	25.00	25.00	.....	.....
Neville Island	24.50	25.00	25.00	25.50	.....
Provo	22.50	23.00	.....	.....	.....
Sharpsville[1]	24.50	25.00	25.00	25.50	.....
Sparrows Point	25.50	26.00	.....	.....	.....
Steelton	25.50	.....	.....	.....	30.50
Swedeland	25.50	26.00	26.50	27.00	.....
Toledo	24.50	25.00	25.00	25.50	.....
Youngstown	24.50	25.00	25.00	25.50	.....

DELIVERED PRICES† (BASE GRADES)

Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	$ .50	$26.00	$26.50	$27.00	$27.50	.....
Boston	Birdsboro-Steelton	4.02	.....	.....	.....	.....	$34.52
Brooklyn	Bethlehem	2.50	28.00	28.50	29.00	29.50	.....
Brooklyn	Birdsboro	2.92	.....	.....	.....	.....	33.42
Canton	Cleveland	1.39	25.89	26.39	26.39	26.89	.....
Canton	Buffalo	3.19	.....	.....	.....	.....	33.69
Cincinnati	Birmingham	4.06	24.06	25.44	.....	.....	.....
Cincinnati	Hamilton	1.11	.....	.....	28 11	.....	.....
Cincinnati	Buffalo	4.40	.....	.....	.....	.....	34.90
Jersey City	Bethlehem	1.53	27.03	27.53	28.03	28.53	.....
Jersey City	Birdsboro	1.94	.....	.....	.....	.....	32.44
Los Angeles	Provo	4.95	27.45	27.95	.....	.....	.....
Los Angeles	Buffalo	15.41	.....	.....	.....	.....	45.91
Mansfield	Cleveland & Toledo	1.94	26.44	26.94	26.94	27.44	.....
Mansfield	Buffalo	3.36	.....	.....	.....	.....	33.86
Philadelphia	Swedeland	.84	26.34	26.84	27.34	27.84	.....
Philadelphia	Birdsboro	1.24	.....	.....	.....	.....	31.74
San Francisco	Provo	4.95	27.45	27.95	.....	.....	.....
San Francisco	Buffalo	15.41	.....	.....	.....	.....	45.91
Seattle	Provo	4.95	27.45	27.95	.....	.....	.....
Seattle	Buffalo	15.41	.....	.....	.....	.....	45.91
St. Louis	Granite City	.50	25.00	25.50	26.00	26.00	.....
St. Louis	Buffalo	7.07	.....	.....	.....	.....	37.57

* Maximum per gross ton, established by OPA February 14, 1945. † Prices do not reflect 3 per cent tax on freight.

(1) Struthers Iron & Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

Charcoal pig iron base prices for Lyles, Tenn., and Lake Superior furnaces, $33.00 and $34.00, respectively. Newberry Brand of Lake Superior charcoal iron $39.00 per g.t., f.o.b. furnace, by order L 39 to RPS 10, April 11, 1945, retroactive to March 7, 1945. Delivered to Chicago, $42.34. High phosphorus iron sells at Lyles, Tenn., at $28.50.

Basing point prices are subject to switching charges; Silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 to 2.25 per cent); Phosphorus differentials, a reduction of 38c. per ton for phosphorus content of 0.70 per cent and over; Manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

Silvery iron and bessemer ferrosilicon up to and including 14.00 per cent silicon covered by RPS 10 as amended Feb. 14, 1945. Silvery iron, silicon 6.00 to 6.50 per cent, C/L per G.T., f.o.b. Jackon, Ohio—$30.50; f.o.b. Buffalo—$31.75. Add $1.00 per ton for each additional 0.50% Si. Add 50c. per ton for each 0.50% Mn over 1.00%. Add $1.00 per ton for 0.75% or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, ¢ per lb, ton lots.

Copper, electrolytic, 150 and 200 mesh	21½¢ to 23½¢
Copper, reduced, 150 and 200 mesh	20½¢ to 25½¢
Iron, commercial, 100 and 200 mesh 96 + % Fe	12½¢ to 15¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots	4¢
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe, drum lots	63¢
Iron, electrolytic, unannealed, 300 mesh and coarser, 99 + % Fe	30 to 33¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	42¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90¢
Aluminum, 100 and 200 mesh	*25¢
Antimony, 100 mesh	30¢
Cadmium, 100 mesh	$1.40
Chromium, 100 mesh and finer	$1.25
Lead, 100, 200 & 300 mesh	11½ to 15¢
Manganese	65¢
Nickel, 150 mesh	51½¢
Solder powder, 100 mesh	8½¢ plus metal
Tin, 100 mesh	58¾¢
Tungsten metal powder, 98%-99%, any quantity, per lb	$2.60
Molybdenum powder, 99%, in 200-lb kegs, f.o.b. York, Pa., per lb.	$2.60
Under 100 lb	$3.00

*Freight allowed east of Mississippi.

COKE

Furnace, beehive (f.o.b. oven)	Net Ton
Connellsville, Pa.	$7.50*
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	9.00
Foundry, By-Product	
Chicago, del'd	13.75
Chicago, f.o.b.	13.00
New England, del'd	14.65
Kearny, N. J., f.o.b.	13.05
Philadelphia, del'd	13.28
Buffalo, del'd	13.40
Portsmouth, Ohio, f.o.b.	11.50
Painesville, Ohio, f.o.b.	12.15
Erie, del'd	13.15
Cleveland, del'd	13.20
Cincinnati, del'd	13.25
St. Louis, del'd	14.25
Birmingham, del'd	10.90

* Hand drawn ovens using trucked coal permitted to charge $8.00 per ton plus transportation charges.

PRICES

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

Base discount less case lots

	Per Cent Off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all lengths	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

⅛ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	**U.S.S.**	**S.A.E.**
Base discount less keg lots		
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 in. through 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full keg lots, 10 per cent additional discount.

Stove Bolts	*Consumer*
Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

Large Rivets

(½ in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets

(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws	*Consumer Per Cent Off List*
Upset full fin, hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.30c.
Armature	3.65c.
Electrical	4.15c.
Motor	5.05c.
Dynamo	5.75c.
Transformer 72	6.25c.
Transformer 65	7.25c.
Transformer 58	7.75c.
Transformer 52	8.55c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

Ferromanganese

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.
Carload lots (bulk) $135.00
Carload lots (packed) 141.00
Less ton lots (packed) 148.50
$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Manganese Metal

Contract basis, lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Spot sales add 2c. per lb.
96-98% Mn, .2% max. C, 1% max. Si, 2% max. Fe.
Carload, bulk ..... 36c.
L.c.l. lots ..... 38c.
95-97% Mn, .2% max. C, 1.5% max. Si, 2.5% max. Fe.
Carload, bulk ..... 34c.
L.c.l. lots ..... 35c.

Spiegeleisen

Maximum base, contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	48.50

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carloads, f.o.b. shipping point with freight allowed.

	Eastern Zone	Central Zone	Western Zone
50% Si ...	6.65c.	7.10c.	7.25c.
75% Si ...	8.05c.	8.20c.	8.75c.
80-90% Si.	8.90c.	9.05c.	9.55c.
90-95% Si.	11.05c.	11.20c.	11.65c.

Spot sales add: 45c. per lb. for 50% Si, .3c. per lb. for 75% Si, .25c. per lb. for 80-90% and 90-95% Si.

Silvery Iron

Silvery Iron, Silicon 14.01 to 14.50 per cent, $45.50 per G. T. f.o.b. Jackson, Ohio. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 per ton for low impurities, not to exceed: P—0.05%, S—0.04%, C—1.00%. Covered by MPR 405.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe..	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe..	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk.	3.35c.	3.50c.	3.65c.
2000 lb-carload	3.8c.	4.2c.	4.25c.

Silicomanganese

Contract basis lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Add .25c. for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.
Carload, bulk ..... 6.05c.
2000 lb. to carload ..... 6.70c.
Under 2000 lb. ..... 6.90c.
Briquets, contract, basis carlots, bulk freight allowed, per lb. .... 5.80c.
2000 lb. to carload ..... 6.30c.
Less ton lots ..... 6.55c.

Ferrochrome

(65-72% *Cr.* 2% *max. Si*)

OPA maximum base contract prices per lb. of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add .25c. per lb. contained Cr for spot sales.

	Eastern Zone	Central Zone	Western Zone
0.06% C	23.00c.	23.40c.	24.00c.
0.10% C	22.50c.	22.90c.	23.50c.
0.15% C	22.00c.	22.40c.	23.00c.
0.20% C	21.50c.	21.90c.	22.50c.
0.50% C	21.00c.	21.40c.	22.00c.
1.00% C	20.50c.	20.90c.	21.50c.
2.00% C	19.50c.	19.90c.	21.00c.
66-71% Cr, 4-10%	13.00c.	13.40c.	14.00c.
62-66% Cr, 5-7% C	13.50c.	13.90c.	14.50c.

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2c. per lb. to regular low-carbon ferrochrome price schedule. Add 2c. for each additional 0.25% N. High-carbon type: 66-71% Cr, 4-5% C, 0.75% N. Add 5c. per lb. to regular high-carbon ferrochrome price schedule.

Low-Carbon Ferromanganese

Contract prices per lb. of manganese contained, lump size, f.o.b. shipping point, freight allowed to destination, Eastern Zone. Add 0.25c. for spot sales.

	Carloads, Ton Bulk	Lots	Less Ton
0.10% max. C, 1 or 2% max. Si..	23.00c.	23.40c.	23.65c.
0.15% max. C, 1 or 2% max. Si..	22.00c.	22.40c.	22.65c.
0.30% max. C, 1 or 2% max. Si..	21.00c.	21.40c.	21.65c.
0.50% max. C, 1 or 2% max. Si..	20.00c.	20.40c.	20.65c.
0.75% max. C, 7.00% max. Si..	16.00c.	16.40c.	16.65c.

Ferrochrome Briquets

Contract prices per lb. of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 60 per cent contained chromium. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk...	8.25c.	8.55c.	8.95c.
Ton lots	8.75c.	9.25c.	10.75c.
Less ton lots..	9.00c.	9.50c.	11.00c.

Ferromanganese Briquets

Contract prices per lb. of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 66 per cent contained manganese. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk..	6.05c.	6.30c.	6.50c.
Ton lots	6.65c.	7.55c.	8.55c.
Less ton lots..	6.80c.	7.80c.	8.80c.

Calcium—Manganese—Silicon

Contract prices per lb. of alloy, lump size, f.o.b. shipping point, freight allowed to destination.
16-20% Ca, 14-18% Mn, 53-59% Si. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carloads	15.50c.	16.00c.	18.05c.
Ton lots	16.50c.	17.35c.	19.10c.
Less ton lots.	17.00c.	17.35c.	19.60c.

Calcium Metal

Eastern zone contract prices per lb. of metal, f.o.b. shipping point, freight allowed to destination. Add 5c. for spot sales. Add 0.9c. for Central Zone; 0.49c. for Western Zone.

	Cast	Turnings	Distilled
Ton lots	$1.80	$2.30	$5.00
Less ton lots..	2.30	2.80	5.75

Chromium—Copper

Contract price per lb. of alloy, f.o.b. Niagara Falls, freight allowed east of the Mississippi River. 8-11% Cr, 88-90% Cu, 1.00% max. Fe, 0.50% max. Si. Add 2c. for spot sales.
Shot or ingot ..... 45c.

Ferroboron

Contract prices per lb. of alloy, f.o.b. shipping point, freight allowed to destination. Add 5c. for spot sales. 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern Zone	Central Zone	Western Zone
Ton lots	$1.20	$1.2075	$1.289
Less ton lots..	1.30	1.3075	1.329

Manganese—Boron

Contract prices per lb. of alloy, f.o.b. shipping point, freight charges allowed. Add 5c. for spot sales.
75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

	Eastern Zone	Central Zone	Western Zone
Ton lots	$1.89	$1.903	$1.935
Less ton lots..	2.01	2.023	2.055

Nickel—Boron

Spot and contract prices per lb. of alloy, f.o.b. shipping point, freight allowed to destination.
15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

	Eastern Zone	Central Zone	Western Zone
11,200 lb. or more ...	$1.90	$1.9125	$1.9445
Ton lots	2.00	2.09125	2.0445
Less ton lots..	2.10	2.1125	2.1445

Other Ferroalloys

Ferrotungsten, Standard grade lump or ¼X down, packed, f.o.b. plant at Niagara Falls, New York, Washington, Pa. York, Pa., per lb. contained tungsten, 10,000 lb. or more.... $1.90

Ferrovanadium, 35-55%, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. contained Va.
Open hearth $2.70
Crucible $2.80
Primos $2.90

Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal..... $1.50

Vanadium pentoxide, 88-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5. Spot sales add 5c. per lb. contained V_2O_5..... $1.10

Silcax No. 3, contract basis, f.o.b. producer's plant with usual freight allowances, per lb. of alloy. (Pending OPA approval)
Carload lots ..... 25c.
2000 lb. to carload..... 26c.

Silvax No. 2, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy (Pending OPA approval)
Carload lots ..... 58c.
2000 lb. to carload..... 59c.

Grainal, f.o.b. Bridgeville, Pa., freight allowed 50 lb. and over, max. based on rate to St. Louis
No. 1 ..... 87.5c.
No. 6 ..... 60c.
No. 79 ..... 45c.

Bortram, f.o.b. Niagara Falls
Ton lots, per lb..... 45c.
Less ton lots, per lb..... 50c.

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per lb. contained Cb.
2000 lb. lots $2.25
Under 2000 lb. lots..... $2.30

Ferrotitanium, 40-45%, 0.10%C. max. f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained Ti.. $1.22
Less ton lots..... $1.25

Ferrotitanium, 20-25%, 0.10%C. max., ton lots, per lb. contained titanium $1.35
Less ton lots..... $1.40

High-carbon ferrotitanium, 15%-20%, 6-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y. freight allowed East of Mississippi River, north of Baltimore and St. Louis, per carload..... $142.50

Ferrophosphorus, 18% electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equalled with Rockdale, Tenn., per gross ton..... 58.50

Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton $75.00

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., any quantity, per lb. contained Mo. 95c.

Calcium molybdate, 40-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained Mo. ..... 80c.

Molybdenum oxide briquets, 48-52% Mo. f.ob. Langeloth, Pa. per lb. contained Mo ..... 80c.

Molybdenum oxide, in cans, f.o.b Langeloth and Washington, Pa. per lb. contained Mo ..... 80c.

Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy. Add ¼c. for spot sales
Carload lots ..... 14c.

Zirconium, 12-15%, contract basis, lump f.o.b. plant usual freight allowances, per lb. of alloy
Carload, bulk ..... 4.6c.

Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk ..... 5.75c.
Ton lots ..... 7.25c.

Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.
Car lots ..... 8.00c.
Ton lots ..... 8.75c.
Less ton lots ..... 9.25c.

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